G R
HONI SOIT QUI MAL Y PENSE
DIEU ET MON DROIT

IMPERIAL INSTITUTE

OF

AGRICULTURAL RESEARCH, PUSA.

JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. LIV. PART I. 1929.

THE FOURTH PRIMULA CONFERENCE, 1928.

A CONFERENCE on Primulas was arranged by the Royal Horticultural Society and held at the Chelsea Show on Thursday, May 24, 1928, and in connexion with it a very extensive exhibition of Primulas was made in an adjoining tent.

Previous Conferences on Primulas have been held by the Society in 1886 (see R.H.S. JOURNAL, **7**, pp. 161–295), in 1895 (see vol. **19**, pp. 40–59), and in 1913 (see vol. **39**, pp. 98–227). In some degree the late date of the present Conference, compared with those previously held, illustrates the change that has come about through the vast extensions of our knowledge of the genus by collections from China, and the consequent lengthening of the period over which the flowering of the members of the genus in our gardens extends, and it emphasizes the change in the point around which at present most interest centres.

THE EXHIBITION.

The exhibition of Primulas completely filled a large tent and included the following exhibits:

Lady Aberconway and the Hon. H. D. McLaren of Bodnant staged a magnificent group of Primulas associated with rocks and with a background of shrubs. Large masses of *P. burmanica*, *P. helodoxa*, *P. pulverulenta* in several forms, and varieties of *P. japonica* were prominent. Less common species included the following: *P. Reidii*, *P. chungensis*, *P. Maximowiczii*, *P. chionantha*, *P. microdonta*, *P. sylvicola*, *P. deflexa*, *P. Wilsoni*, *P. apoclita*, *P. seclusa*, *P. effusa*, *P. redolens*, *P. Forrestii*, *P. tsarongensis*, *P. yargongensis*, *P. latisecta*, *P. cyanantha*, *P. sinolisteri*, *P. mollis*, *P. nutans*, *P. aurantiaca*, *P. Waltoni*, *P. werringtonensis*, *P. anisodora*, and *P. flexilipes*.

Messrs. Baker of Codsall exhibited some very large plants of

P. Florindae, together with *P. secundiflora*, *P. chrysopa*, *P. Smithiana*, *P. Giraldiana*, *P. anisodora*, *P. farinosa*, *P. Wardii*, *P. Sieboldii*, *P. cortusoides*, *P. microdonta* var. *violacea*, *P. werringtonensis*.

Colonel C. Brook of Annan showed *P. Bulleyana*, *P. Beesiana*, forms of *P. pulverulenta*, *P. Mooreana*, *P. sikkimensis*, *P. Littoniana*, and *P. secundiflora*.

Mr. G. H. Dalrymple of Bartley arranged a group in which his varieties of *P. pulverulenta* and a hybrid of *P. japonica* and *P.* 'Lissadell Hybrid' called 'Sir George Thursby' were conspicuous. In addition, *P. burmanica*, *P. Mooreana*, *P. vittata*, *P. nutans*, *P. Littoniana*, and *P. septemloba* were well shown.

Mr. James Douglas of Bookham showed a number of unnamed Auricula seedlings.

Mr. W. E. Th. Ingwersen of Sharpthorne exhibited a large number of species and hybrids, chiefly of the Auricula section, some out of flower, and besides these *P. Veitchii*, *P. cyanantha*, *P. yargongensis*, *P. secundiflora*, and *P. pulverulenta*.

The John Innes Horticultural Institute, Merton, showed a large number of specimens of *P.* × *kewensis* and *P. sinensis* varieties illustrating breeding experiments which are in progress at the Institute.

Colonel W. Kemmis of Lymington put up a large collection which included a very fine group of *P. nutans*. Other species represented were *P. Littoniana*, *P. helodoxa*, *P. Florindae*, *P. vittata*, *P. septemloba*, *P. seclusa*, and *P. muscarioides*.

Dr. MacWatt of Duns exhibited many rare and interesting plants. In addition to Show Auriculas and gold-laced Polyanthuses there were specimens of *P. Cockburniana*, *P. Forbesii*, *P. reticulata*, *P. algida*, *P. Ellisae*, *P. heucherifolia*, *P. sibirica*, *P. Menziesiana*, *P. chrysopa*, *P. chionantha*, and other species.

Messrs. Maxwell and Beale of Broadstone arranged a large group around a pool, using the popular Candelabra species and varieties. *P. secundiflora*, *P. sikkimensis*, *P. capitata*, *P. longiflora*, and *P. farinosa alba* were also shown.

Messrs. Oliver & Hunter of Moniaive had an excellent exhibit of plants evincing great cultural skill. *P. Littoniana*, *P. melanops*, *P. luteola*, *P. flexilipes*, *P. nutans*, and *P. Forrestii* occupied prominent positions, backed by the taller Candelabra and Sikkimensis species. Among the latter, *P. prionotes* and *P. microdonta alpicola* were noticeable.

The Director, R.H.S. Gardens, Wisley, showed a large group of *P. japonica*, demonstrating colour-variation in this species. Some very good white and rose-coloured forms were included.

Messrs. Storrie & Storrie of Glencarse exhibited strains of bedding Polyanthuses and border Auriculas, Primroses, and richly-coloured hybrid Cowslips.

Messrs. Sutton of Reading staged a brilliant group of *P. obconica grandiflora* in all its bright colours, and a series of coloured pictures of many varieties.

Messrs. Wm. Wood & Son of Taplow showed *P. farinosa* 'Craven Gem,' a deeply coloured variety, *P. rosea*, *P. chrysopa*, *P. secundiflora*, *P. Veitchii*, *P. sikkimensis*, *P. pulverulenta*, and *P. Cockburniana*.

Other smaller exhibits were made by Mrs. H. Milford, Chedworth; C. T. Musgrave, Esq., Godalming; Primley Botanic Nursery, Paignton; and Mr. E. Scaplehorn, Beckenham, Kent.

THE CONFERENCE.

The Chair was taken at the morning session by Sir DAVID PRAIN, F.R.S., V.M.H. The papers before the Conference were:

1. "The Sections of the Genus Primula," by Professor W. W. SMITH, M.A., V.M.H., and G. FORREST, V.M.H. (p. 4). This paper was available to the Conference in the "Notes of the Royal Botanic Garden, Edinburgh," and in the unavoidable absence of the authors an epitome was given by Mr. F. J. CHITTENDEN, V.M.H., and illustrated by plates from the *Botanical Magazine* and by living specimens. The paper itself, subsequently revised and altered in arrangement by the authors, and with illustrations added, is reprinted in this Report by kind permission of H.M. Stationery Office.
2. "Inheritance in *Primula sinensis*," by Miss DE WINTON of the John Innes Horticultural Institution (p. 84).
3. "*Primula kewensis* and its Derivatives," by the late W. C. F. NEWTON and Miss C. PELLEW of the John Innes Horticultural Institution (p. 91).
4. "Hybrids of *Primula Juliae* with the Primrose and Oxlip," by Dr. C. L. HUSKINS of the John Innes Horticultural Institution (p. 95).

At the afternoon session the Chair was taken by Mr. E. A. BOWLES, M.A., V.M.H., and the papers presented to the Conference were:

5. "Chinese Primulas at Home," by Dr. HANDEL-MAZZETTI of the Natural History Museum, Vienna (p. 51).
6. "Asiatic Primulas for the Garden," by the Hon. H. D. MACLAREN (p. 63).
7. "Primulas flowered at Wisley," by Mr. N. K. GOULD, Assistant Botanist, R.H.S. Gardens, Wisley (p. 69).
8. "Cultivation of some New and Uncommon Primulas," by J. ADAMSON of Messrs. Oliver and Hunter, Moniaive, Dumfries (p. 77).

The papers are not printed strictly in the order as presented, for it seemed better to bring close together in the Report those which dealt particularly with the Eastern Primulas, and the important papers relating to the genetics of Primulas follow.

At the conclusion of the sessions the respective chairmen expressed the thanks of the Conference to the readers of the papers and referred to the regret felt that neither Mr. NEEDHAM, who was to have addressed the Conference on "Old Garden Primroses," nor Professor HESLOP HARRISON, on "Hybrids of the Vernales Section of Primula," was able to attend to present their papers to the Conference.

THE SECTIONS OF THE GENUS PRIMULA.*

By Professor WILLIAM WRIGHT SMITH, M.A., V.M.H., and
GEORGE FORREST, V.M.H.

SOME introductory notes are necessary in explanation of the reasons for presenting a revision of the sections of this extensive genus. It is now clear that its greatest development is in the alpine regions of western China and secondarily in the Himalaya. Since the time of the last Primula Conference in 1913 there has been added a considerable number of new species, collected by various explorers, as well as further material of known species which has served to elucidate many doubtful points.

In dealing with the sections of Primula, reference must first be made to the pioneer work of Professor PAX in his Monograph on Primulaceae dated 1905. Grateful tribute has been paid to the author by all workers on the genus. In his paper on the "Chinese Species of Primula" at the 1913 Conference Professor BAYLEY BALFOUR in introducing his own analysis of the sections of the Chinese species expresses his appreciation of the Monograph and his own indebtedness to it.† At the time of that Conference it was already clear that the numerous additions in the way of Chinese and Himalayan species necessitated modifications of PAX's treatment of the sections concerned and BALFOUR's tentative list of sections was an attempt to deal with the problem as far as the material then available permitted. But BALFOUR put these modifications forward without suggestion of finality as he was only too well aware that much further analysis was needed. In regrouping the species he instituted a considerable number of new sections, increasing PAX's twenty-one to double that number. These new sections were however provisional, were defined in a general way, and were not clearly discriminated one from the other by the insertion of any key. Some of them, especially the smaller sections, were convenient placements for certain little-known or little-understood species which had then no clear affinity with the larger sections. Obvious examples are Sertulum and Glacialis. Of these difficulties BALFOUR was well aware, and in his subsequent papers on the new species which continued to stream in he gives here and there clear indication of changes of view. Unfortunately he did not live to give these complete written expression.

As the written record of Primula sections stands, the position is consequently somewhat indefinite. The Monograph of PAX is no longer adequate for the treatment of the East Asiatic species, while the Balfourian sections require that adjustment which he would undoubtedly have given them. The present authors were closely associated with Professor BALFOUR during the last twenty years of his life and had frequent opportunities of discussion with him on Primula, especially as regards the species of the Himalaya, Tibet, and China. They may be permitted to mention that they have collected widely in these regions with Primula as one of the main objectives, and have seen " living " or " dead " all the described species of the genus with the exception of some eight which they still hope to view. The dried material accumulated in the Edinburgh Herbarium is probably the most ample collection of the genus in the world. It is not therefore the lack of opportunity which can be held responsible for any defects which may appear in the analysis of the sections submitted to this Conference of 1928.

---

* Reprinted, with alterations, from *Notes from the Royal Botanic Garden, Edinburgh*, No. lxxvi., March 1928, by kind permission of the Controller of H.M. Stationery Office.

† *Jour. R.H.S.*, 39, p. 130.

It will tend to a better understanding of the proposed arrangement if we revert to PAX's Conspectus of the sections (Monogr. p. 18). Of his twenty-one sections some will remain unaltered in their general scope—Auricula, Bullatae, Carolinella, Vernales ; some are amplified—Minutissimae, Petiolares, Nivales ; one is retained as to name but modified as to character—Soldanelloideae ; some are retained as sections but modified as to name—Monocarpicae (Malacoides), Sredinskya (Grandis), Floribundae (Verticillata), Cordifoliae (Rotundifolia), Cankrienia (Candelabra), Fallaces (Reinii) ; some have been subdivided and the names retained in a restricted sense—Sinenses, Capitatae ; some are withdrawn—Macrocarpae for the reasons given under the section Cuneifolia, Dionysiopsis for reasons given under Verticillata, Callianthae partly merges in Nivales, Tenellae is divided among other sections, Omphalogramma is a distinct genus. In the choice of sectional names, it has not been possible to retain in all cases the original name of each section ; a preference has been given in some cases to later names which appear more appropriate and more easily remembered. The name of the outstanding species of the section is the most useful if otherwise applicable. We do not want to recall Monocarpicae * and Sredinskya if Malacoides and Grandis serve better. But we have introduced no new ones and have endeavoured to adhere to those which have gained a general currency.

As regards the Balfourian sectional names as they appeared in the JOURNAL R.H.S., **39**, and in the Herbarium the following sections are absorbed in greater aggregates—Auriculatae in Farinosae (as PAX in his Monograph), Elongata in Nivales, Gemmifera in Farinosae, Geranioides in Cortusoides, Glacialis in Nivales and in Farinosae, Mollis in Cortusoides, Maximowiczii in Nivales, Chartacea and Davidi in Petiolares, Sertulum in Farinosae, Sonchifolia in Petiolares, Tongolensis in Petiolares, Yunnanensis in Farinosae. Some of these, however, can be retained as names for subsections. We have used PAX's Bullatae in preference to Suffruticosa as the latter name invites unwarranted association with *P. suffrutescens*; so too Pinnatae of R. Knuth is a good name and is prior to Filchnerae.

---

* Not applicable to section as now constituted.

The sections consequently are as follows:—

Amethystina, Balf. f.
Auricula, Duby.
Bella, Balf. f.
Bullatae, Pax emend. (Suffruticosa, Balf. f.).
Candelabra, Balf. f. (Cankrienia, De Vriese).
Capitatae, Pax emend.
Carolinella, Pax emend.
Cortusoides, Balf. f. (including Mollis, Balf. f. and Geranioides, Balf. f.).
Cuneifolia, Balf. f.
Denticulata, Balf. f. (Capitatae, Pax, pro parte).
Dryadifolia, Balf. f.
Farinosae, Pax amplif.
Grandis, Balf. f. (Sredinskya, Stein).
Malacoides, Balf. f. (Monocarpicae, Franch.).
Malvacea, Balf. f.
Megaseaefolia, Balf. f.
Minutissimae, Pax.
Muscarioides, Balf. f. (Capitatae, Pax, pro parte).
Nivales, Pax.
Obconica, Balf. f. (Name curtailed).
Obtusifolia, Balf. f.
Petiolares, Pax.
Pinnatae, R. Knuth (Filchnerae, Balf. f.).
Pycnoloba, Balf. f.
Reinii, Balf. f. (Fallaces, Pax, pro parte).
Rotundifolia, Balf. f. (Cordifoliae, Pax, pro parte).
Sikkimensis, Balf. f.
Sinenses, Pax (sensu restricto).
Soldanelloideae, Pax emend.
Souliei, Balf. f.
Vernales, Pax.
Verticillata, Balf. f. (Floribundae, Pax, pro parte).

KEY TO THE SECTIONS.

A1. INVOLUTAE.

Young leaves folded *inwards*.

B1. Leaves ± fleshy or leathery; flowers in umbels; bracts not leafy **Auricula** (p. 44)
B2. Leaves membranous; flowers in superposed whorls; bracts leafy . . . . **Verticillata** (p. 45)

A2. REVOLUTAE.

Young leaves folded *outwards*.

B1. Campanulatae.

Flowers campanulate or cylindric ; corolla-lobes not reflexed.

C1. Efarinose ; glabrous ; leaves gland-punctate **Amethystina** (p. 21)

C2. Inflorescence farinose ; flowers pedicelled ; corolla cylindric **Grandis** (p. 27)

C3. Inflorescence farinose ; flowers pedicelled ; corolla campanulate **Sikkimensis** (p. 41)

C4. Inflorescence farinose ; flowers sessile ; corolla campanulate **Soldanelloideae** (p. 36)

B2. Infundibuliformes.

Flowers infundibular ; corolla-lobes patent or reflexed.

C1. Efariniferae.

No farina ; leaves in all sections with articulated hairs, except three or four glabrous species ; leaves in most sections with distinct petiole and lobed lamina. (Flowers never sessile ; bracts never saccate.)

D1. Leaves decurrent, not lobed. . . **Vernales** (p. 20)

D2. Leaves very distinctly petioled.

E1. Leaves ± lobed.

F1. Leaves *pinnate* and almost bipinnate **Pinnatae** (p. 17)

F2. Calyx very large, *much exceeding corolla* **Pycnoloba** (p. 18)

F3. Calyx inflated, *widest at base*, lobes not patent **Sinenses** (p. 19)

F4. *Calyx cupular*, foliaceous, narrow at base, lobes patent, exposing fruit, *flowers in many superposed whorls or racemose* . . . . **Malvacea** (p. 19)

F5. *Calyx cupular*, foliaceous, narrow at base, fruit included, *flowers generally in simple umbels* **Obconica** (p. 18)

F6. *Calyx ± tubular*, rigid, prominently ribbed, capsule ± included . . . . . **Cortusoides** (p. 16)

F7. Calyx ± tubular, rigid, prominently ribbed, capsule elongate, *much extruded* . . **Reinii** (p. 17)

E2. Leaves not lobed.

F1. Inflorescence a congested raceme ; capsule opening by a lid . . . . . **Carolinella** (p. 20)

F2. Inflorescence a simple umbel ; capsule opening by irregular teeth . . . **Megaseaefolia** (p. 20)

C2. Fariniferae.

All sections ± farinose (very slightly in Cuneifolia) ; certain sections as Candelabra and Farinosae contain some obviously related efarinose species ; articulated hairs rarely present and then associated with farina ; leaves usually not lobed except in Malacoides and Souliei and occasionally in Muscarioides.

D1. Flowers ± sessile in dense capitula or spikes; bracts not saccate; no woody rhizome.

E1. Flowers of capitulum ± erect . . **Denticulata** (p. 33)

E2. Flowers of capitulum pendent . . **Capitatae** (p. 34)

E3. Flowers of spike pendent . . . **Muscarioides** (p. 35)

D2. Flowers ± sessile in few-flowered capitula; bracts not saccate, foliaceous; rhizome massive, woody, covered with old leaves . . . . **Dryadifolia** (p. 28)

D3. Flowers 1–3, ± sessile; corolla-throat with ball of hairs; no rhizome . . . . **Bella** (p. 29)

D4. Flowers pedicelled, rarely sessile and then with saccate bracts.

E1. Capsule globuse, not opening by teeth, crumbling at maturity . . . . . . **Petiolares** (p. 23)

E2. Capsule globose or cylindric, opening by definite teeth.

F1. Leaves ± fleshy, glabrous, with shape and toothing *recalling Saxifraga umbrosa*; very obscurely farinose on pedicels and calyx only; chiefly Japanese **Cuneifolia** (p. 22)

F2. Leaves membranous, ± *lobed*, orbicular to ovate, *pubescent* with *articulated* hairs, base ± cordate, petiole distinct; inflorescence farinose; capsule globose, included . . . **Malacoides** (p. 26)

F3. *Massive woody rhizome*, clothed with cushion of old leaves; leaves ± *bullate*, glandular-pubescent and farinose; bracts large ± *foliaceous*; capsule globose, included . . . . **Bullatae** (p. 27)

F4. Leaves decurrent, membranous to chartaceous, generally efarinose; inflorescence in *many superposed umbels*, usually farinose; several efarinose species with the inflorescence of this section belong here; capsule ± globose, included, rarely subcylindric, exserted **Candelabra** (p. 42)

F5. Leaves ± membranous to chartaceous, rarely fleshy; bracts ± *saccate or produced below insertion*; some non-saccate species of Farinosae affinity included here; a few efarinose species belong here; capsule usually cylindric, sometimes ± globose **Farinosae** (p. 30)

F6. Leaves membranous, *finely scabrid*, lamina usually *pinnately cut or indented*; petiole distinct; bracts not saccate; capsule cylindric . **Souliei** (p. 30)

F7. Leaves *fleshy*, glabrous, usually farinose; lamina decurrent; bracts not saccate; capsule *cylindric*, generally *far extruded*. . . **Nivales** (p. 38)

F8. As Nivales but *leaves long-petiolate*, *lamina rotundate*, base cordate . . . . **Rotundifolia** (p. 37)

F9. As Nivales but leaves *membranous, petioles very elongated weak,* capsule cylindric ± *equalling* calyx
Obtusifolia (p. 38)

F10. Very dwarf species, *often stoloniferous,* flowers *minute, solitary or few* ; bracts not saccate
Minutissimae (p. 28)

ALTERNATIVE KEY TO SECTIONS.

1.	Young leaves folded inwards	2
	Young leaves folded outwards	3
2.	Flowers in umbels ; bracts not leafy	**Auricula** (p. 44)
	Flowers in superposed whorls, bracts leafy	**Verticillata** (p. 45)
3.	Flowers campanulate or cylindric (no eye)	4
	Flowers infundibular (eye distinct)	7
4.	Flowers cylindric	**Grandis** (p. 27)
	Flowers campanulate	5
5.	Flowers sessile	**Soldanelloideae** (p. 36)
	Flowers pedicelled	6
6.	Inflorescence farinose	**Sikkimensis** (p. 41)
	Inflorescence efarinose	**Amethystina** (p. 21)
7.	All parts efarinose ; leaves generally lobed, long-petiolate, pubescent	8
	Farina present, copious or scanty ; leaves rarely lobed, generally decurrent	17
8.	Leaves decurrent, not lobed	**Vernales** (p. 20)
	Leaves very distinctly petioled	9
9.	Leaves ± lobed	10
	Leaves not lobed	16
10.	Leaves pinnate, almost bipinnate	**Pinnatae** (p. 17)
	Leaves not pinnate	11
11.	Calyx exceeding corolla	**Pycnoloba** (p. 18)
	Calyx shorter than corolla	12
12.	Calyx very wide at base	**Sinenses** (p. 19)
	Calyx narrowed at base	13
13.	Calyx cupular, foliaceous	14
	Calyx tubular, rigid	15
14.	Flowers in many superposed whorls or racemose	**Malvacea** (p. 19)
	Flowers generally in simple umbels	**Obconica** (p. 18)
15.	Capsule ± included	**Cortusoides** (p. 16)
	Capsule far exserted	**Reinii** (p. 17)
16.	Flowers in congested racemes	**Carolinella** (p. 20)
	Flowers in a simple umbel	**Megaseaefolia** (p. 20)

17.	Flowers ± sessile ; bracts not saccate .	18
	Flowers pedicelled ; bracts occasionally saccate	22
18.	Corolla throat with ball of hairs . .	**Bella** (p. 29)
	Corolla throat open	19
19.	Massive rhizome ; capitulum few-flowered	**Dryadifolia** (p. 28)
	No rhizome ; inflorescence many-flowered	20
20.	Flowers in dense spikes . . .	**Muscarioides** (p. 35)
	Flowers in dense capitula . . .	21
21.	Flowers ± erect	**Denticulata** (p. 33)
	Flowers ± pendent	**Capitatae** (p. 34)
22.	Capsule globose, crumbling, not opening by teeth	**Petiolares** (p. 23)
	Capsule globose or cylindric, opening by teeth	23
23.	Leaves shaped and indented as in *Saxifraga umbrosa*.	**Cuneifolia** (p. 22)
	Leaves quite unlike those of *Saxifraga umbrosa*.	24
24.	Massive woody rhizome ; leaves ± bullate ; bracts leafy . . .	**Bullatae** (p. 27)
	No woody rhizome	25
25.	Leaves ± lobed or strongly indented, petiolate	26
	Leaves not lobed nor deeply cut . .	27
26.	Capsule globose included . . .	**Malacoides** (p. 26)
	Capsule cylindric exserted . . .	**Souliei** (p. 30)
27.	Lamina orbicular and cordate, petiole long distinct	**Rotundifolia** (p. 37)
	Lamina not orbicular, decurrent . .	28
28.	Bracts generally ± saccate . .	**Farinosae** (p. 30)
	Bracts never saccate	29
29.	Minute species, often solitary flowers .	**Minutissimae** (p. 28)
	Robuster species, inflorescence many-flowered	30
30.	Capsule globose	**Candelabra** (p. 42)
	Capsule cylindric	31
31.	Leaves fleshy : capsule exserted . .	**Nivales** (p. 38)
	Leaves membranous ; capsule equalling calyx	**Obtusifolia** (p. 38)

We believe that it may be useful to give here some account of the characters which have been used in the discrimination of the sections, to point out the relative values of these characters, and also to indicate where, owing to exceptional species, caution is necessary in the use of the key.

The infolding of the leaves in two of the sections is a character long recognized and quite trustworthy. The division line between these sections Auricula and Verticillata is easy to draw and requires no further explanation. Use is then made of the corolla-shape. In four sections the corolla is distinctly bell-shaped or cylindric, with the lobes more or less *in line* with the tube or at the most not sharply bent back as in most Primulas. This is in our opinion a very important divisional mark. In most Primulas the junction of tube and corolla-lobes is marked by a distinct " eye," often by an annulus, and the lobes usually lie more or less at right angles to the tube. The four sections thus cut off are readily distinguished from one another and the *only* exceptional species occur in Amethystina where *P. Dickieana* and *P. aureostellata* have patent lobes and consequently non-campanulate corollas. They have however the peculiar leaves of the Amethystina section and are best retained there. All the sections which follow have the corolla-lobes more or less patent, sometimes completely reflexed as in *P. szechuanica* and its allies.

The next character, presence or absence of farina, requires caution in its use. The sections placed under Efariniferae show no exceptions in their lack of farina ; but in the Fariniferae instances occur in several sections of species which are free from farina. The affinities of these exceptional species are so obviously with farinose species that they must be included in the farinose sections. Fortunately the lack of farina in the Efariniferae is correlated with other relatively strong characters and the sum of these criteria make discrimination fairly certain. We find in the Efariniferae that in all sections the leaves have long articulated hairs except in one or two glabrous species, that the leaves have usually a long and very clearly marked-off petiole except in the section of the common primroses (Vernales), and that in seven of the ten sections the leaves are distinctly lobed. This lobing usually goes far beyond marginal indentation ; the outline of the leaf frequently becomes pentagonal or heptagonal as in the leaves of the species of Geranium.

From the ten sections of the Efariniferae, Vernales is easily discriminated by the more or less decurrent non-lobed leaves, the only marked exception being in *P. Juliae* where the glabrous leaf is rounded-cordate with the long and distinct petiole of the other sections. Two other sections have leaves without lobing but with distinct petioles. One is the peculiar Chinese Carolinella with distinctive inflorescence and capsule ; two of the three species are glabrous. The other is Megaseaefolia with a solitary species.

The seven sections with lobed leaves present little difficulty in discrimination from one another. If we leave out Pinnatae which was not known at the time of the Monograph (1905), Pax very correctly indicates three possible divisions based on the character of the calyx (p. 19). He recognizes *P. sinensis* as standing apart, his Poculiformia with cupular-foliaceous calyx would correspond to Malvacea and Obconica, and his Cortusina with rigid tubular calyx to Cortusoides.

We have brought Reinii into the group; half of PAX's Fallaces belongs in any case to Cortusoides. The only noteworthy deviations in these seven sections are: (1) the inflorescence in dwarf specimens of certain species of Malvacea may be a simple umbel; (2) in some Obconicas the lobation of the leaf becomes obscure; (3) the calyx of *P. neurocalyx* in Malvacea verges on the tubular shape.

We now come to the main assemblage of the sections where the species are generally more or less farinose. The farina is somewhat fluctuating in its appearance; it may be copiously present or almost absent on the same species; some sections such as Candelabra rarely show it on the leaves; others like Nivales are rarely efarinose on the leaves; but in doubtful cases its final stronghold is to be looked for at the apex of the scape, on the bracts, pedicels, and at the base of the calyx.

The last character of primary importance is the type of inflorescence. Almost sessile flowers are comparatively infrequent but five sections can be segregated by that feature. But it must be noted in connexion therewith that the bracts in those sections are non-saccate. It happens that almost sessile flowers occur in some Farinosae but in these the bracts are distinctly saccate. These five sections are readily separable, one from the other, by the points given in the key. The only caveat necessary is that in some species of Denticulata the pedicels become somewhat manifest.

A character of secondary importance—the dehiscence of the capsule—is of service in marking off the large aggregate of Petiolares. This section contains several subsections, each almost entitled to sectional rank, but it seems better to keep all together as one unit. The capsules of most Primulas open at the apex by a series of teeth, the degree of splitting being variable. In Petiolares the capsule is globose, at the base very adherent to the lower part of the calyx; the apex of the capsule appears to be of very different consistency from the lower portion; it is often semi-transparent and the outline of the seeds can often be seen through the wall; as we have observed on several occasions in the field in the Himalaya and China, this upper part gives way (fig. 3); it tends more to crumble than to come off in a piece while the seeds, lying on a broad convex placenta, are usually washed out by the rain; these seeds appear to lose their germinating power quickly and only one or two species of this large section have ever been brought into cultivation. These remarks apply to all the species of which we have had sufficient fruiting material to examine, but it has to be allowed that of many species in this section further observations of the fruiting stages are necessary before general application of these characters is possible. Calyx-shape is not a character of much service for sectional divisions in the Fariniferae but it may be noted here that the calyx of the Petiolares is rather distinctive, recalling somewhat that of Obconica.

That part of the key which deals with the remaining ten sections presents a little more difficulty. Certain secondary characters are of service but the sections require to be taken almost individually for explanation. The Candelabra inflorescence serves for the section so-named but some of its species have simple umbels while stout species in other sections may attain to a candelabroid inflorescence. Saccate bracts are characteristic of Farinosae but some species within that section and undoubtedly in their proper place have no signs of gibbosity in the bracts. This gibbosity occurs only rarely outside Farinosae and then obscurely. The stoloniferous habit is marked in Minutissimae but it occurs also in Farinosae and Denticulata. Something can be done with the contrast between globose and cylindric capsules; some sections are restricted to one type, but in some important sections both kinds of capsule may occur. The calyx in some cases gives to the eye some indication of the affinity but its qualities are not easily expressed in words. The woody rhizome in Bullatae is diagnostic but stout rhizomes are found occasionally elsewhere. The rotundate leaf with long petiole is rare in the Fariniferae but marks out Rotundifolia.

The fleshy glabrous saxifrage-like leaves are for Cuneifolia the best guide. The species of this section have been described as efarinose but farinipotent hairs are sparingly present on the pedicels and base of calyx. The section, however, need run no chance of confusion with any member of the Efariniferae. One species in it—*P. suffruticosa*—has a stout rhizome.

The pubescent petiolate lobed leaves and globose capsule of Malacoides are reminiscent of Obconica but farina is usually abundant except in the glabrous efarinose species *P. Cavaleriei* and *P. pellucida*. The calyx of the section is not that of Obconica.

Bullatae is easy of recognition by the characters given. The close mat of desiccated old leaves is very characteristic of Bullatae and Dryadifolia.

Candelabra is a natural section. As has been already pointed out, the numerous superposed umbels are present in most species but the smaller species may have only one umbel or two at most while superposition of umbels is of not infrequent occurrence in other sections. The leaves are efarinose except occasionally in *P. Cockburniana*. But the appearance of minute globose glands on the under-surface of the leaves in Candelabra Primulas suggests *potential* mealiness. Where farina occurs it is usually on the inflorescence and especially on the outside or inside of the calyx lobes. But nearly half the section are efarinose even on the inflorescence (as *P. anisodora*, *P. Poissonii* and *P. serratifolia*). However, the characteristic hairs of the Efariniferae are entirely absent. The leaves otherwise often resemble those of the common Primulas of the section Vernales. The capsule is almost always globose, the only exception being *P. Poissonii* where it is shortly cylindric. In spite of these inconsistencies the only species included which are likely to cause hesitation in ascription to Candelabra are the dwarf ones such as *P. prenantha*.

The remaining six sections are nearly allied to each other, and lines of distinction are consequently less easy to draw. The two dominant sections, Farinosae and Nivales, are of close kinship. Use must here be made of the character of saccate bracts. Where these occur they are diagnostic for Farinosae. But the degree of gibbosity varies and several species must be included in Farinosae although their bracts show no decided evidence of pouching. Several instances occur of pairs of closely allied species, one with saccate bracts and one with the gibbosity obsolete. The same holds with regard to farina, but in this respect the same species may be farinose or almost efarinose. In many cases it would appear to be a matter of environment. PAX saw clearly enough that several species with bracts scarcely gibbous must be included in his Farinosae, and we are in entire agreement concerning the ones he specified—with the proviso that some of them such as *P. tibetica* really show ample gibbosity and need no concession for admission. The following seem to us necessarily within the section :

(*a*) *P. flava*, *P. macrocarpa*, *P sertulum*, *P. yunnanensis* and its associates *P. annulata*, *P. kialensis*, *P. membranifolia*, *P. Umbrella* ; all these show evident kinship with *P. farinosa* and *P. modesta* ; *P. yunnanensis* and its allies represent the section Yunnanensis, Balf. f., which in our opinion comes within the scope of Farinosae ;

(*b*) Dwarf species associated with *P. concinna*—*P. glabra*, *P. kongboensis*, *P. pseudoglabra*, *P. pygmaeorum*, *P. Walshii*, some with gibbous bracts ;

(*c*) Associated with *P. sibirica* and *P. tibetica*—*P. fasciculata*, *P. oxygraphidifolia* (in which the flowers are solitary and so without bracts), *P. Reginella* ;

(*d*) *P. gemmifera* and its subspecies ; these are related to *P. involucrata* and *P. sibirica* in the shape and texture of the leaves and in the flower-structure—but differ as to the bracts. They represent the section Gemmifera, Balf. f., but are better kept as a subsection under Farinosae.

The section Souliei is closely akin to Farinosae, but a distinct petiole is usually developed and the finely scabrid lamina is generally more or less indented, often deeply cut.

There follows the large aggregate of Nivales. These have a very fleshy leaf, most often markedly farinose ; the bracts are never saccate ; the calyx is of characteristic shape, marked generally along the edges of the lobes with farina ; the capsule is in most cases *far* exserted. In the introduction to the section will be found a short review.

Rotundifolia is of Nivales kinship and can be marked off readily by the long distinct petiole and orbicular lamina.

Obtusifolia is a small group of Himalayan species of Nivales affinity with leaves of slender texture, long weak petioles, and capsules which are but shortly cylindric. We regard this section as somewhat intermediate in character between the two large aggregates of Farinosae and Nivales.

Last and least is Minutissimae. The flowers are generally solitary and half-hidden in the mat of small leaves. The majority tend to be stoloniferous. The section appears to have kinship with Farinosae.

The sections are now taken up in phyletic sequence and a brief introduction is given to each, along with a list of the included species. An attempt has been made in some cases to arrange the species so that their relationships one to another may be understood, but much detailed work still requires to be done. Keys to the species in each section have yet to be undertaken.

The numerous synonyms occurring in the record of Primula are not fully dealt with in the pages which follow. Only a few have been quoted. A complete index of Primula names will appear in a future publication.

Our grateful thanks are due to the following for the loan of various type specimens:—to Dr. A. W. HILL, Director of the Royal Botanic Gardens, Kew; to Professor H. LECOMTE, Director of the Department of Botany, Museum of Natural History, Paris; to Professor Dr. L. DIELS, Director of the Botanic Garden and Museum, Berlin-Dahlem; to Professor Dr. B. ISSATCHENKO, Director of the Botanic Garden, Leningrad; and to Col. A. T. GAGE, formerly Superintendent of the Royal Botanic Garden, Sibpur, Calcutta. To Dr. HANDEL-MAZZETTI, of the Museum of Natural History, Vienna, we are particularly indebted for loan of specimens and most valuable criticism and advice during the progress of the work.

[NOTE.—The paper, as printed here, has been modified as regards the arrangement of the sections and of the species included in each section. In *Notes Roy. Bot. Gard., Edin.* (1928), vol. xvi., pp. 12 *et seq.*, the order of the sections and of the species is alphabetical. In the present issue it has been judged better to arrange the sections and their species in an approximately phyletic sequence. This alteration should have the advantage of bringing related species together. The numbering of the species and subspecies may be of service for the adjustment of herbarium material of the genus. The opportunity has been taken to rectify some omissions and to make some minor alterations. The changes are as follows:

P. coreana, Nakai, as we have been informed by Professor NAKAI, is a variety of *Cortusa Matthioli*, Linn. *P. cachemiriana*, Munro, and *P. Fortunei*, Vatke, have been eliminated from the list of species and subspecies as both are doubtful and probably of garden origin. Two members have been added to the section Reinii. In the recently published *Flora Sibiriae et Orientis Extremi* (Leningrad, 1926) appears *P. ajanensis*, E. Busch, added to Farinosae. To the same section belong *P. laurentiana*, Fernald, and *P. intercedens*, Fernald, published in *Rhodora* (April 1928). *P. Licentii* is transferred from Malacoides to Farinosae, in proximity to *P. gemmifera*, Batal.—suadente Dr. HANDEL-MAZZETTI. *P. intermedia*, Sims, as a prior name, replaces *P. longiscapa*, Ledeb.

The original paper contained two diagrams but no illustrations. The illustrations, which are included herewith, are due to the generosity of the Royal Horticultural Society, and the authors take this opportunity of making grateful acknowledgment.]

Section I.—CORTUSOIDES, Balf. f.

(Figs. 1, 2, 57.)

This section represents a large part of what was included by PAX in his section Sinenses. It combines the three sections instituted by BALFOUR—Cortusoides, Mollis and Geranioides. It has not been found possible to draw a definite line between Mollis and Cortusoides; Geranioides has been retained as a subsection; the species therein are in the majority of cases readily separable from Eu-cortusoides but some are of intermediate character. It seems better therefore to keep them under the wing of Cortusoides.

The section like its allies lacks farina, has articulated hairs and a tendency to marked lobing of the leaves. Its calyx characters separate it readily from Sinenses, Obconica and Malvacea. The Geranioides subsection is marked by the somewhat orbicular leaves, more often broader than long and by the palmate venation as opposed to the more oblong leaves of Eu-cortusoides with pinnate venation.

The distribution of the section is chiefly N.E. Asia, including Japan and the northern and western provinces of China, extending into adjoining parts of Tibet and the Eastern Himalaya.

Horticulturally it is one of the less difficult sections, and several of the species are well established in cultivation.

Subsection Eu-cortusoides.

1. P. cortusoides, Linn.
*2. P. saxatilis, Komarov.
3. P. Sieboldii, E. Morren.
4. P. lactiflora, S. Turk.
5. P. Kaufmanniana, Regel.
6. P. polyneura, Franch.
    P. lichiangensis var. *hapala*, Balf. f. et Forrest.
    Subspecies.
        7. P. hymenophylla, Balf. f. et Forrest.
        8. P. lichiangensis, G. Forrest (fig. 1).
        9. P. sataniensis, Balf. f. et Farrer.
        10. P. sikuensis, Balf. f. et Farrer.
        11. P. Veitchii, Duthie.
12. P. cinerascens, Franch.
    Subspecies.
        13. P. sinomollis, Balf. f.
        14. P. sylvicola, Hutch.
        15. P. violodora, Dunn.
16. P. mollis, Nutt.
    Subspecies.
        17. seclusa, Balf. f. et Forrest.

---

* The prior name is *P. patens*, Turcz.

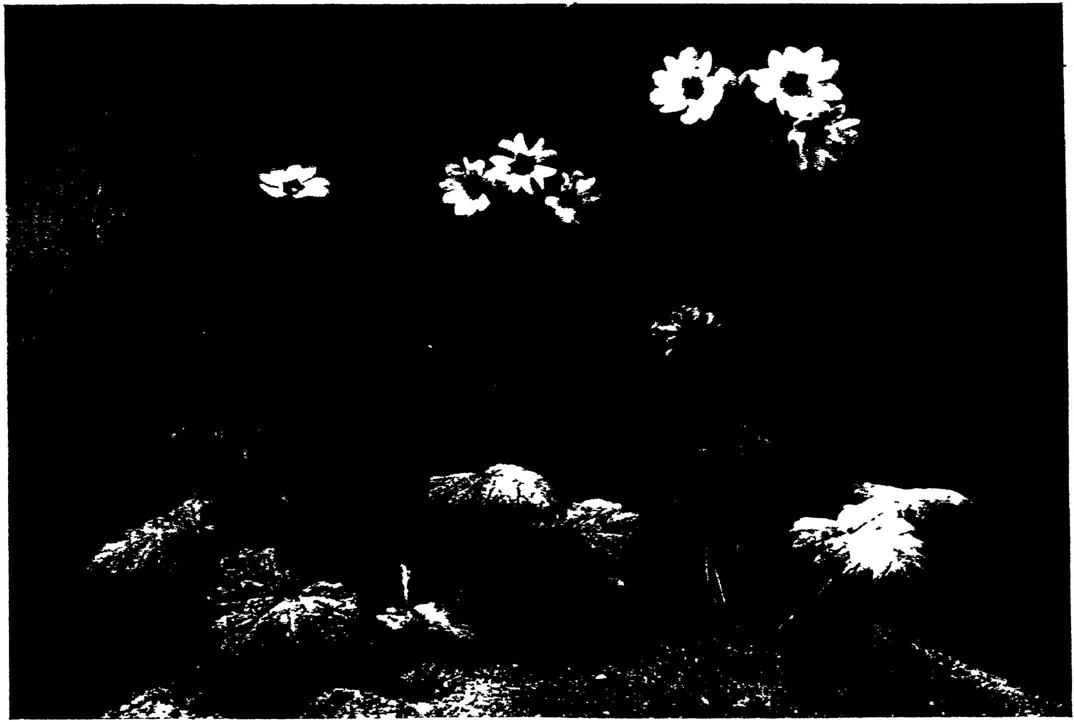


FIG. 1.—PRIMULA LICHIANGENSIS G. FORR.
(p. 16)

[To face p. 16.

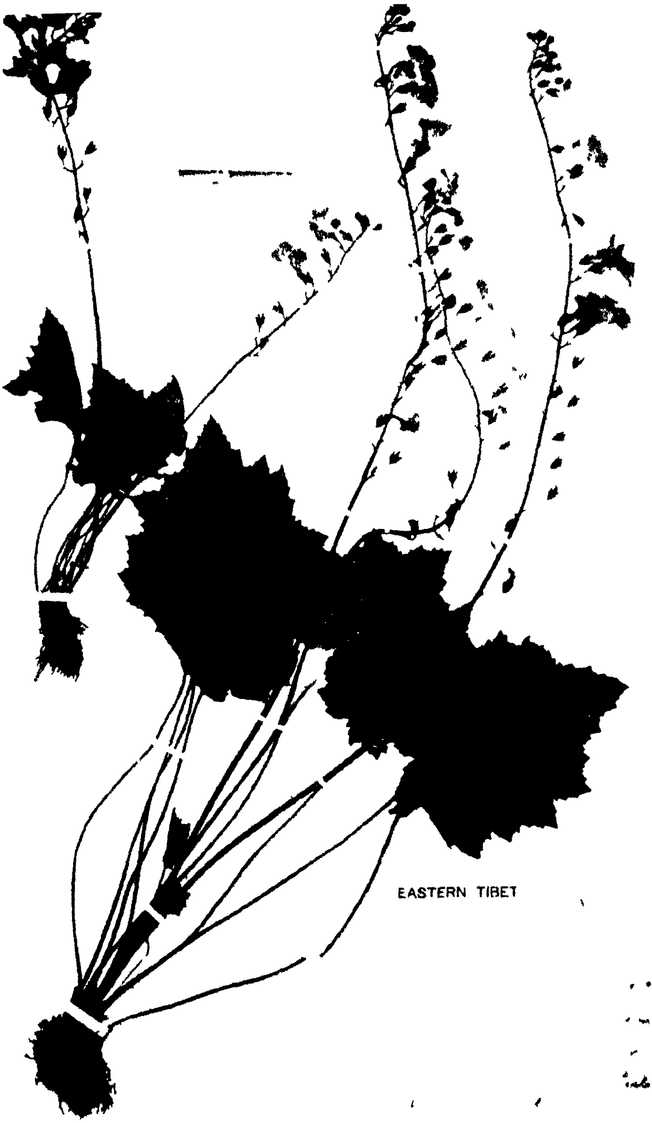


Fig. 2 —Primula Pauliana.
(p. 17)

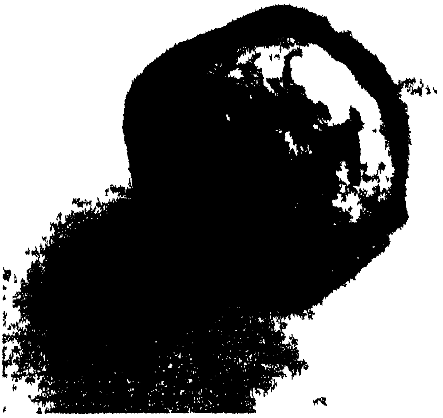


FIG. 3 PRIMULA WINTERI
(Ripe fruit with ruptured wall 3)
(pp 17, 24)

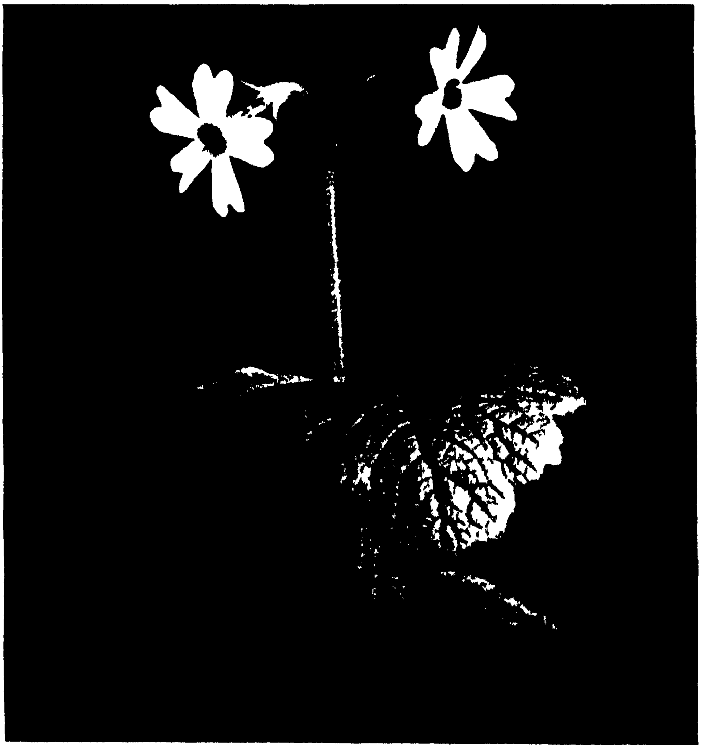


FIG. 4 PRIMULA TOSAENSIS Yatabe
(p 17)

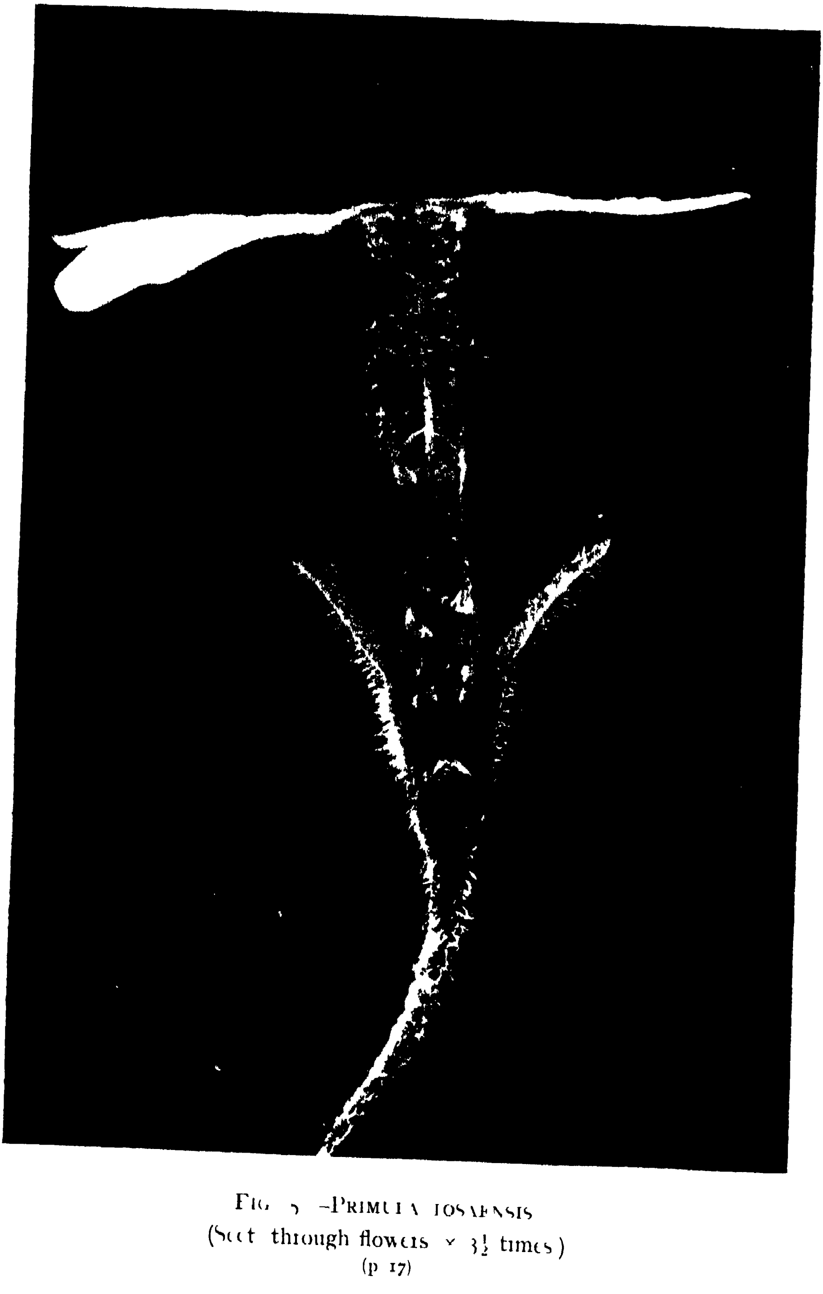


FIG. 5.—PRIMULA TOSAENSIS

(Sect. through flowers × 3½ times.)

(p. 17)

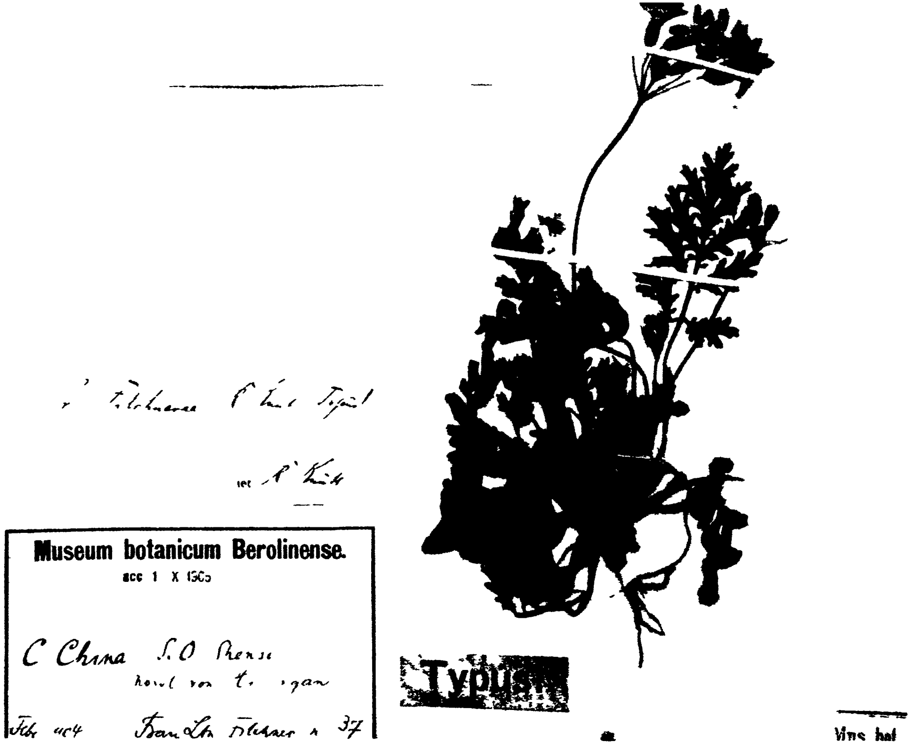


FIG. 6. PRIMULA FILCHNERAE Knuth
[illegible]

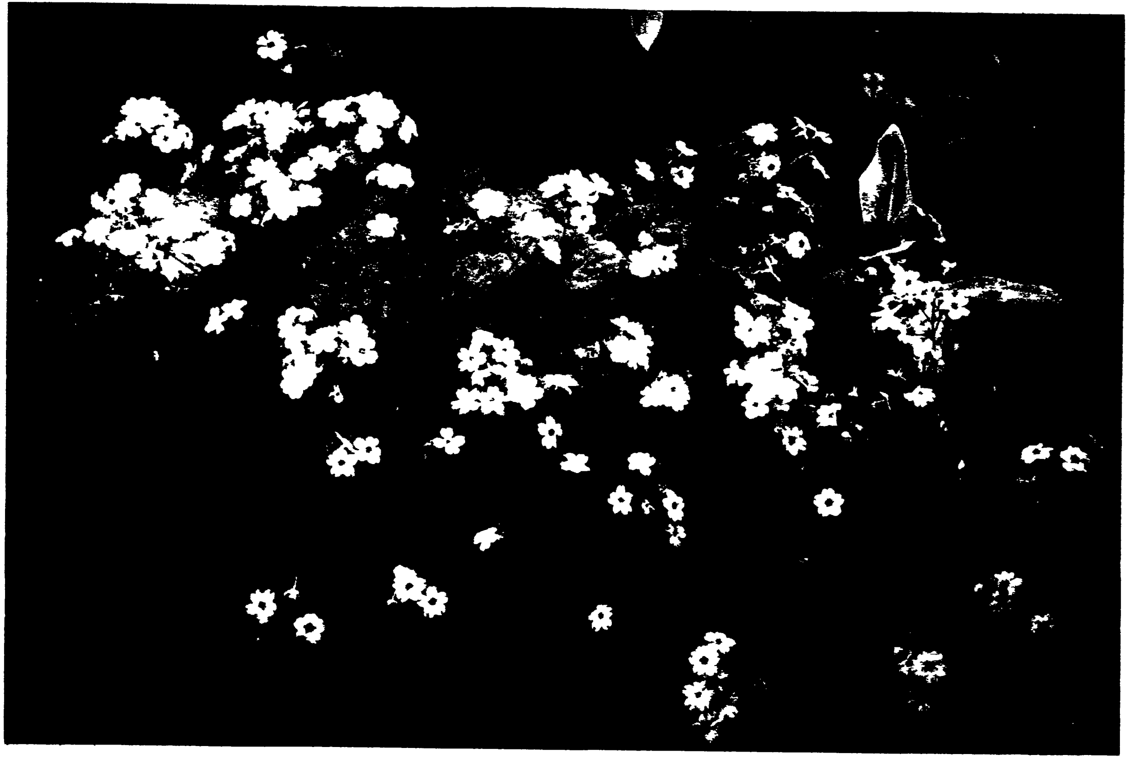


FIG 7 —PRIMULA SINOLISTERI Balf f
(p 18

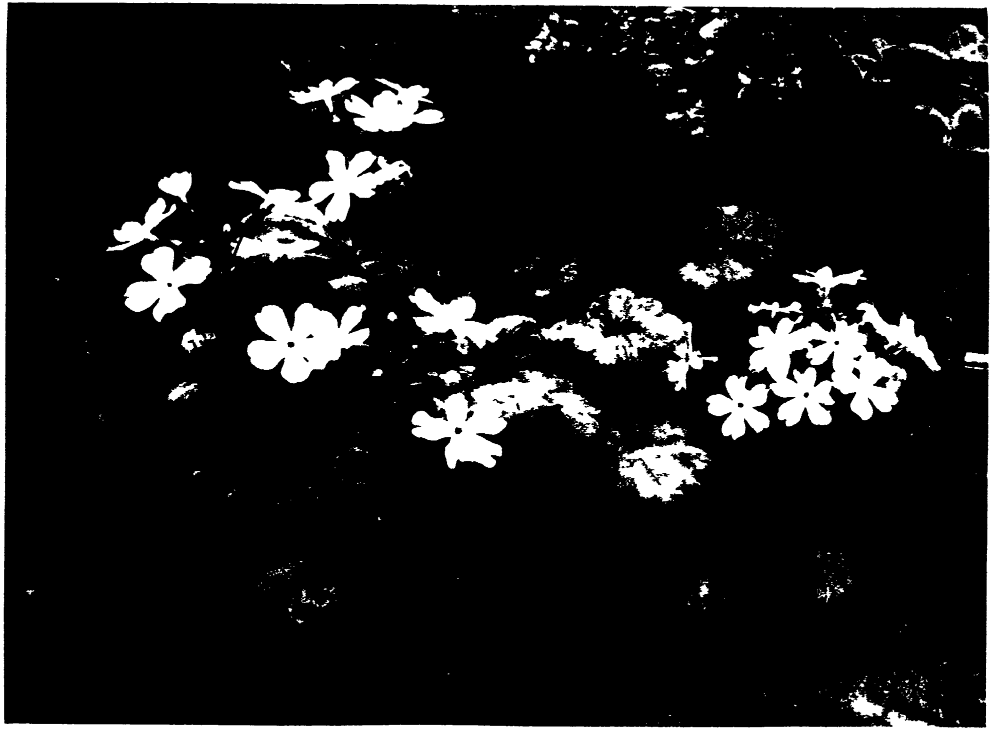


FIG 8 —PRIMULA CALCIPHILA Hutch
(p 19

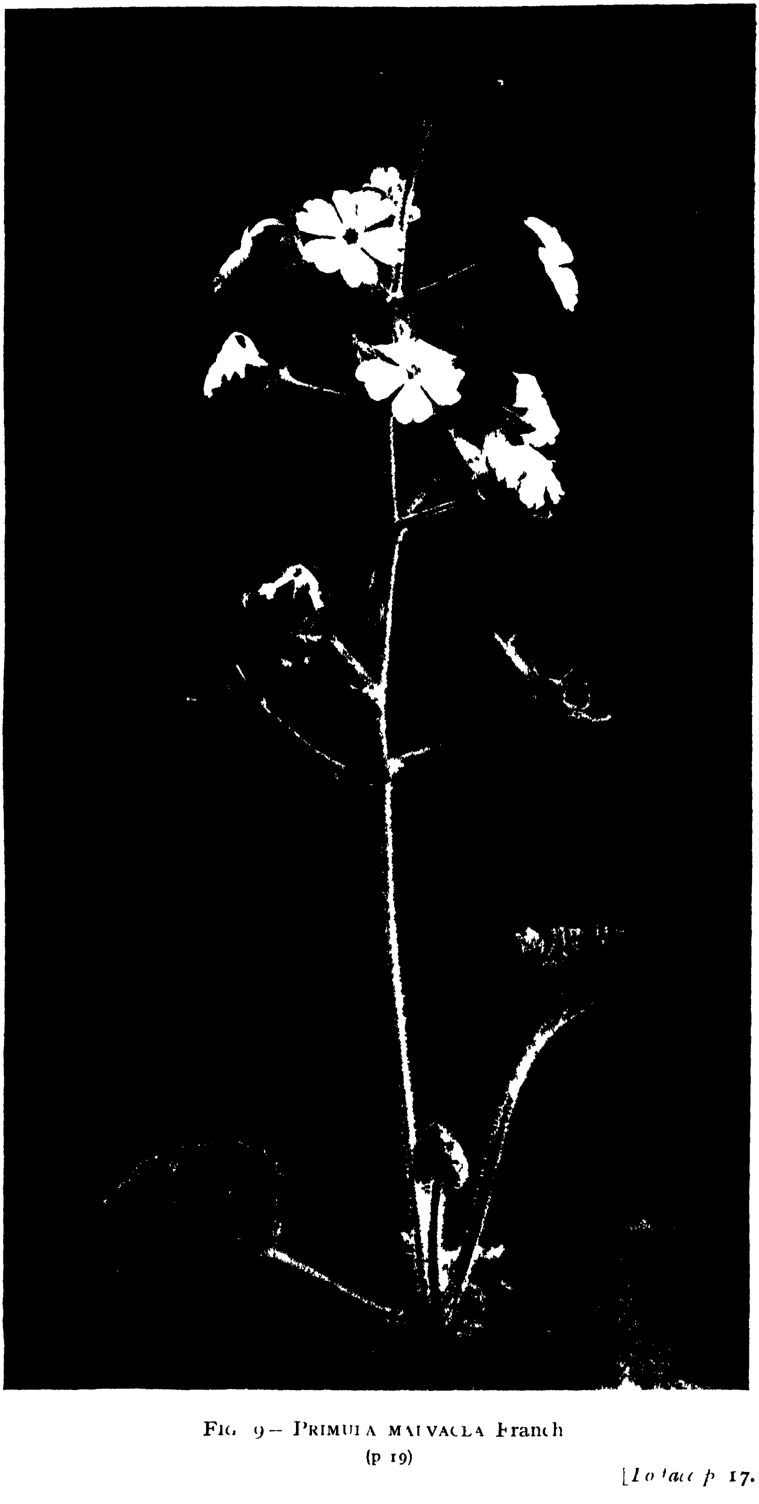


FIG. 9.—PRIMULA MALVACEA Franch.
(p. 19)

[To face p. 17.

**Subsection Geranioides.*

18. P. kisoana, Miq.
19. P. jesoana, Miq.
20. P. Paxiana, Gilg.
21. P. Maclareni, Balf. f.
22. P. heucherifolia, Franch.
    P. lanata, Pax et Hoffm.
    P. oculata, Duthie.
    Subspecies.
        23. P. humicola, Balf. f. et Forrest.
24. P. geraniifolia, Hook. f.
25. P. septemloba, Franch.
26. P. alsophila, Balf. f. et Farrer.
27. P. latisecta, W. W. Sm. (fig. 57).
28. P. palmata, Hand.-Mzt.
29. P. vaginata, Watt.
30. P. eucyclia, W. W. Sm. et Forrest.
31. P. Pauliana, W. W. Sm. et Forrest (fig. 2).

Section II.—REINII, Balf. f.

(Figs. 4, 5.)

This small section contains four species, natives of Japan. In their orbicular lobulate leaves and lack of farina they are akin to Sinenses and the sections associated with it. *P. Reinii* has been in cultivation and may be so still. It and its allies have very large cylindric capsules, much exceeding the calyx.

32. P. Reinii, Franch. et Sav.
32*a*. P. Okamotoi, Koidz.
32*b*. P. senanensis, Koidz.
33. P. tosaensis, Yatabe (figs. 4, 5).

Section III.—PINNATAE, R. Knuth.

(Fig. 6.)

This is a very small section of peculiar Primulas, no one of which is in cultivation. They are allied to the sections Sinenses and Cortusoides and are distinguished readily by their pinnatifid to pinnate leaves with the lobes again pinnatifid or markedly serrate. As in the allied sections there is no farina; the leaves may be pubescent or glabrous.

They appear to be small and rather delicate species of some 2 to 6 inches in height. They are found in Eastern China and have been collected in flower during February and March.

---

* *P. coreana,* Nakai, formerly assigned here, is a variety of *Cortusa Matthioli,* Linn.

A similar cutting of the lamina of the leaf occurs also in the section Souliei where *P. pectinata* shows it quite to the same degree but only occasionally. But there is no kinship indicated with Pinnatae.

34. P. Filchnerae, R. Knuth (fig. 6).
35. P. erodioides, Schltr.
36. P. cicutariifolia, Pax.
37. P. Merrilliana, Schltr.

Section IV.—PYCNOLOBA, Balf. f.

(Fig. 58.)

P. pycnoloba is a curiosity among Primulas by reason of its remarkable calyx. In its leaf characters and lack of farina it is akin to Sinenses and the allied sections. It has been in cultivation since 1906 but is still uncommon.

38. P. pycnoloba, Bur. et Franch (fig. 58.)

Section V.—OBCONICA, Balf. f.

(Fig. 7.)

The many described species of this section all centre round *P. obconica* and for the most part can be regarded as subspecies of that very variable plant. The section is very fully discussed by Professor BALFOUR in *Trans. Bot. Soc. Edin.* xxvi. (1914), p. 301, with numerous illustrations. We have placed under *P. obconica* those which appear to deviate least from the typical plant. Those which present somewhat marked differences from *P. obconica* have been retained meanwhile in the rank of species. Observations on their behaviour in cultivation are much needed, but it is doubtful if living plants of any apart from *P. obconica*, *P. sinolisteri* and *P. werringtonensis* are available in gardens.

The section is usually included in that division of Primula which has lobed leaves and no farina. The lobing in some is obscure, but the affinity of the section is undoubtedly with the lobed Primulas.

39. P. obconica, Hance.
    P. Bonatii, Knuth.
    P. poculiformis, Hook. f.
    Subspecies.
    40. P. barbicalyx, Wright.
    41. P. begoniiformis, Petitm.
    42. P. densa, Balf. f.
    43. P. parva, Balf. f.
    44. P. Petitmengini, Bonati.
    45. P. sinolisteri, Balf. f. (fig. 7).
    46. P. Vilmoriniana, Petitm.
    47. P. werringtonensis, Forrest.

48. P. Listeri, King.
    Subspecies.
        49. P. austrolisteri, Balf. f.
50. P. ambita, Balf. f.
51. P. flavicans, Hand.-Mzt.
52. P. dumicola, W. W. Sm.
53. P. filipes, Watt.
54. P. kweichouensis, W. W. Sm.
55. P. subtropica, Hand.-Mzt.
56. P. oreodoxa, Franch.

Section VI.—SINENSES, Pax.

(Fig. 8.)

This small section consists of the well-known garden plant *P. sinensis* with two allies, one (*P. rupestris*) from Kansu and one (*P. calciphila*) from Hupeh. There is no representative outside the confines of China. From the allied sections Malvacea and Obconica it is readily distinguished by the character of the calyx—inflated with a broad truncate base. The exact relationships of the two wild species with the cultivated plant are not fully determined, but the question is dealt with in *Kew Bull.* (1923), 97, and in *Bot. Mag.* 8986, where *P. calciphila* is figured.

57. P. calciphila, Hutch. (fig. 8).
58. P. rupestris, Balf. f. et Farrer.
59. P. sinensis, Lindl.

Section VII.—MALVACEA, Balf. f.

(Figs. 9, 10.)

This is a very distinct section of Primula, allied in its lobed leaves and lack of farina to the section Sinenses. The leaves are usually orbicular; the elongated scape bears numerous flowers arranged in irregular whorls or strung out in a racemose fashion in some species; the calyx enlarges in fruit into a green leafy expansion with very patent lobes exposing the globose capsule. The flowers are rose to rose-purple, sometimes yellow. The larger species are very beautiful and showy, but have not taken kindly to cultivation. *P. malvacea, P. blattariformis* and *P. bathangensis* have been flowered in gardens but are now lost.

60. P. malvacea, Franch. (fig. 9).
        var. alba, Forrest.
    Subspecies.
        61. P. Rosthornii, Diels.
            P. malvacea, Franch. var. *intermedia,* W. W. Sm. et Forrest.
62. P. barybotrys, Hand.-Mzt.
    P. atrotubata, W. W. Sm. et Forrest.

63. P. neurocalyx, Franch.
    Subspecies.
        64. P. riparia, Balf. f. et Farrer.
65. P. blattariformis, Franch.
    Subspecies.
        66. P. Tenana, Bonati.
            P. blattariformis, Franch. var. *Duclouxii* Bonati.
67. P. bathangensis, Petitm. (fig. 10).
    P. pintchouanensis, Petitm.
    P. racemosa, Bonati.
    P. stephanocalyx, Hand.-Mzt.
68. P. celsiaeformis, Balf. f.
    P. racemosa, Lévl.
69. P. microstachys, Balf. f. et Forrest.
70. P. aromatica, W. W. Sm. et Forrest.

Section VIII.—CAROLINELLA, Pax.

(Fig. 11.)

Three Chinese Primulas belong to this peculiar section. None is in cultivation. It is an isolated group. The foliage suggests that of certain members of the Davidi subsection of Petiolaris, but calyx, corolla, and fruit are very different. The leaves are not lobulate but the species seem nearer to the Primulas with lobed leaves than to any of the other sections.

71. P. Henryi, (Hemsl.) Pax.
72. P. obovata, (Hemsl.) Pax (fig. 11).
73. P. Partschiana, Pax.

Section IX.—MEGASEAEFOLIA, Balf. f.

(Fig. 61.)

This is represented by only one species, *P. megaseaefolia* from Asia Minor. Like *P. grandis* it is an isolated species without near kinship. It does not accord well with the section Carolinella in which it has been placed. Rather does it tend towards *P. Juliae*, especially in its flower characters, and thus towards the section Vernales. It is cultivated often as a greenhouse plant, but can be grown outside, if not always satisfactorily.

74. P. megaseaefolia, Boiss (fig. 61).

Section X.—VERNALES, Pax.

(Figs. 12, 13.)

This is the section containing the common primrose and oxlip. It is chiefly European, extending also into Western and Northern Asia. The section is very fully and adequately dealt with by PAX in his

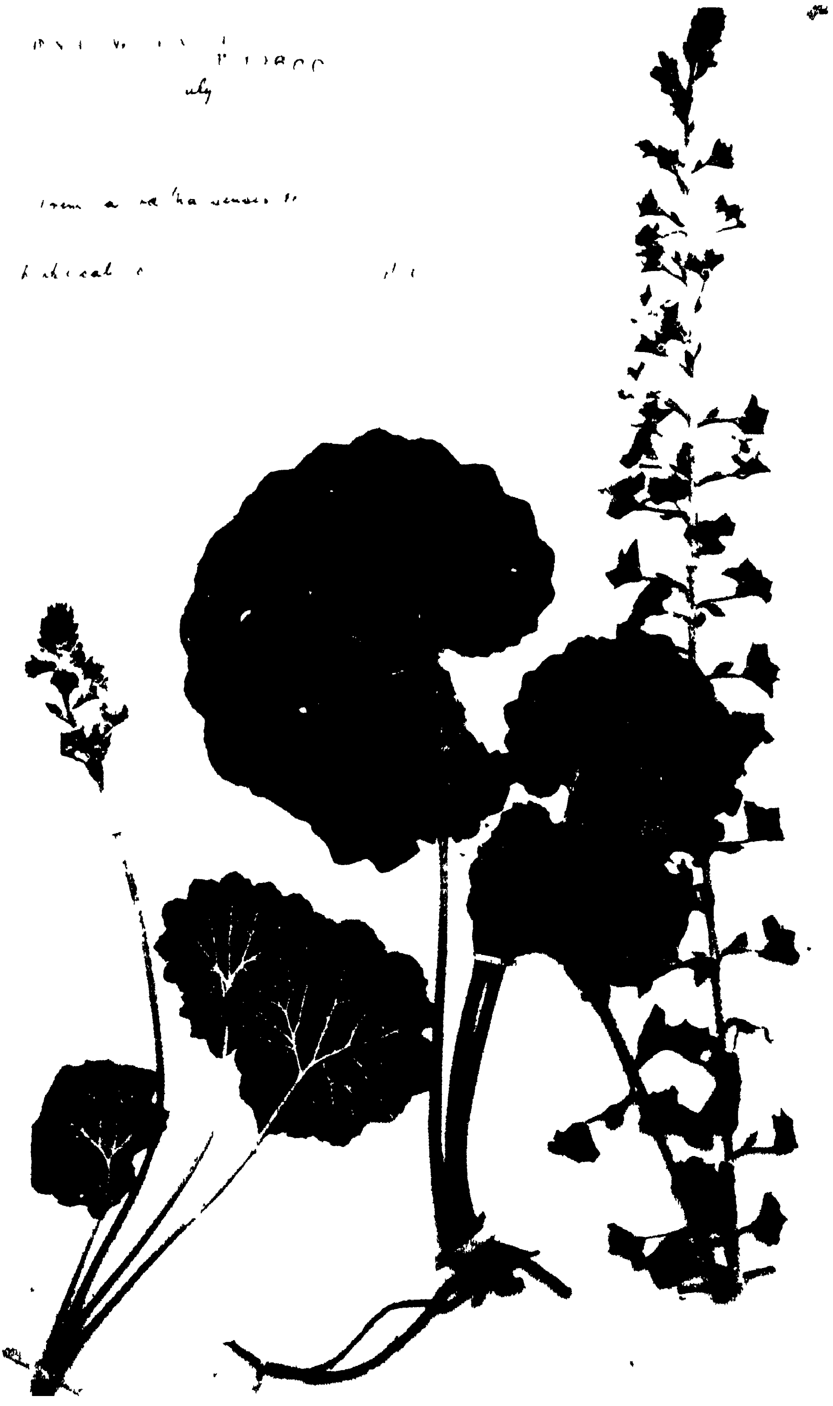


FIG. 10.—PRIMULA BATHANGENSIS Petitm.

(p. 20)

[*To face p.* 20.

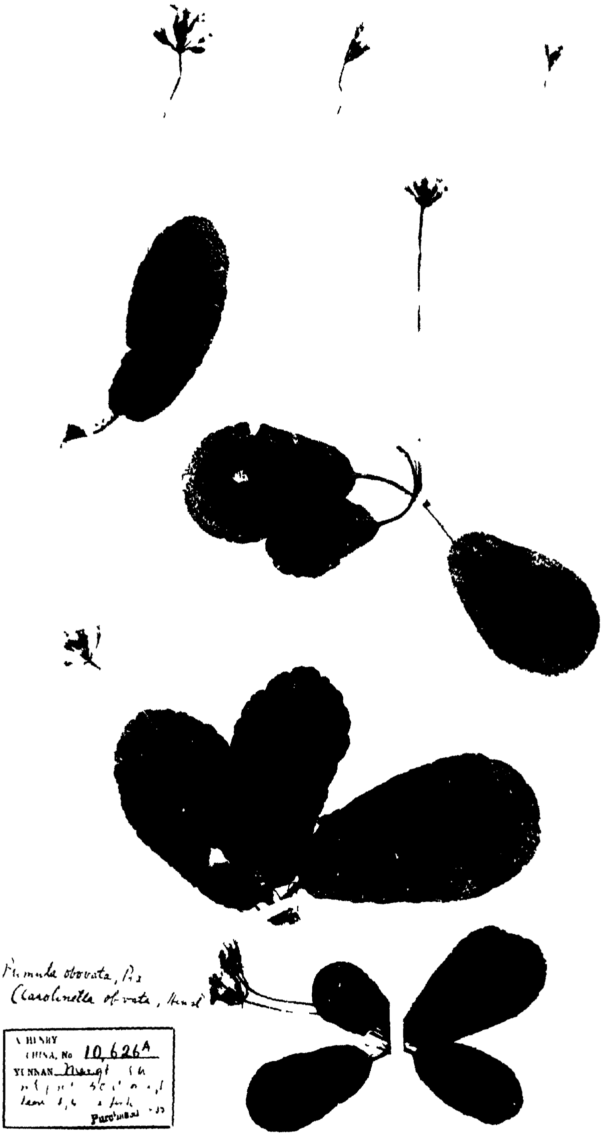


FIG. 11.—PRIMULA OBOVATA Pax.

(p. 20)

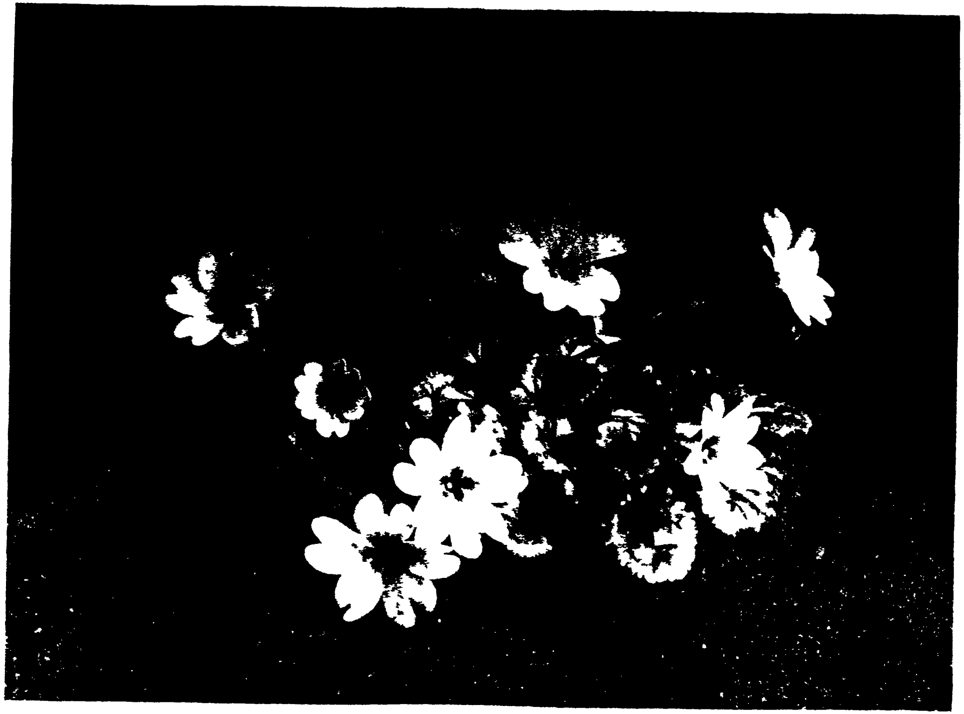


FIG 12 —PRIMULA JULIAE Kusnetzow
(p 21)

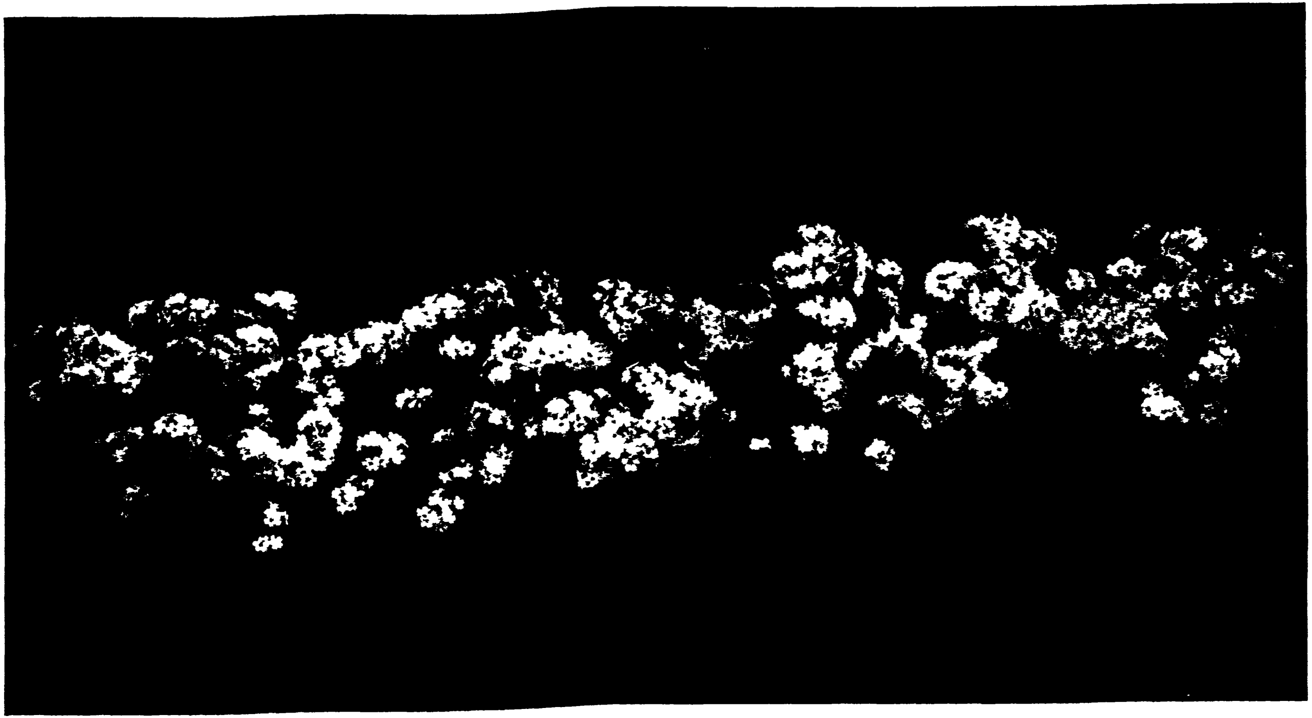


FIG 1 PRIMULA ELATIOR Schreber
(p 21

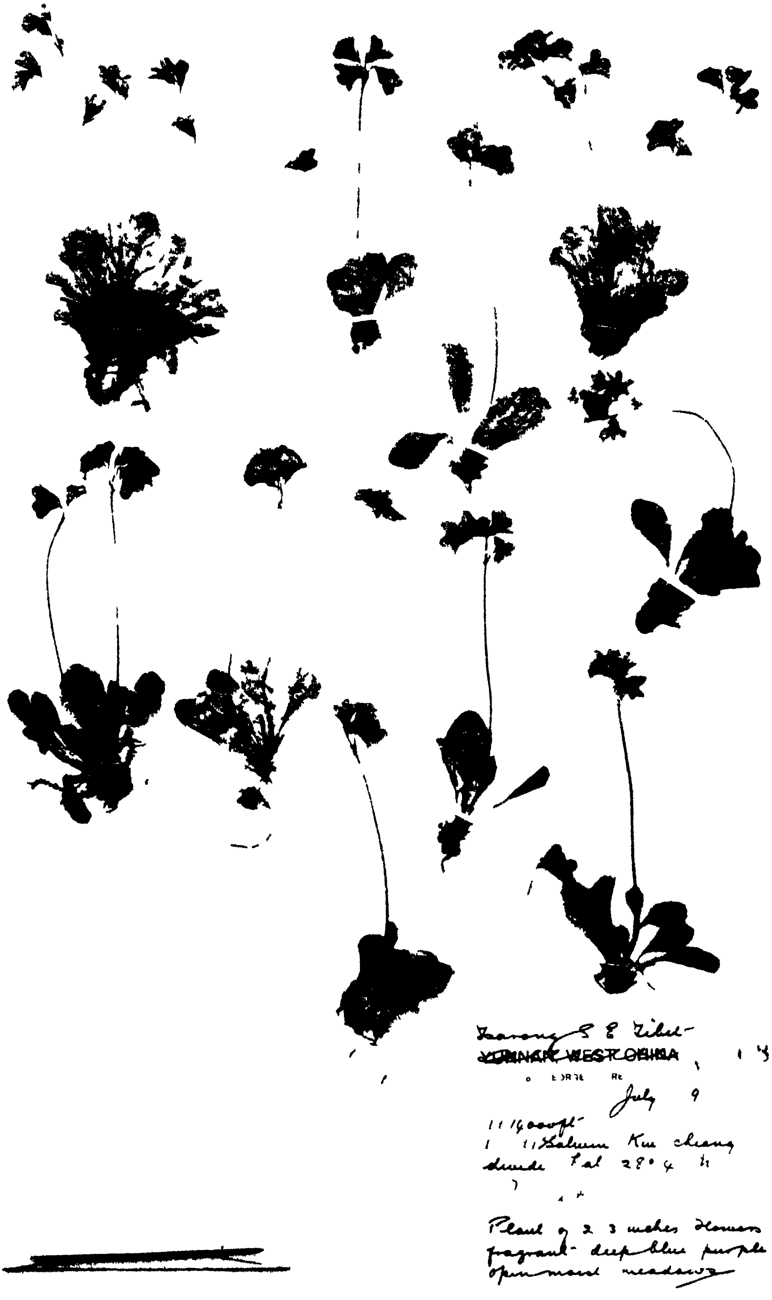


Fig. 14. PRIMULA SH ALENSIS Petitm.
(p. --

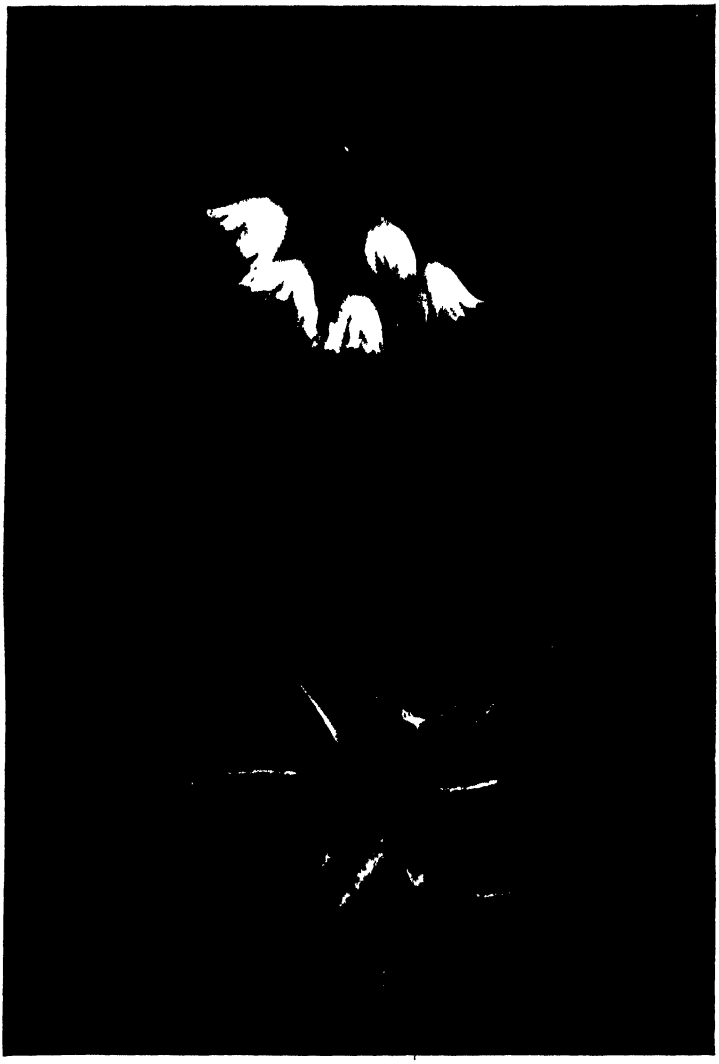


Fig. 15—Primula brevifolia Forr.

(p. 22)

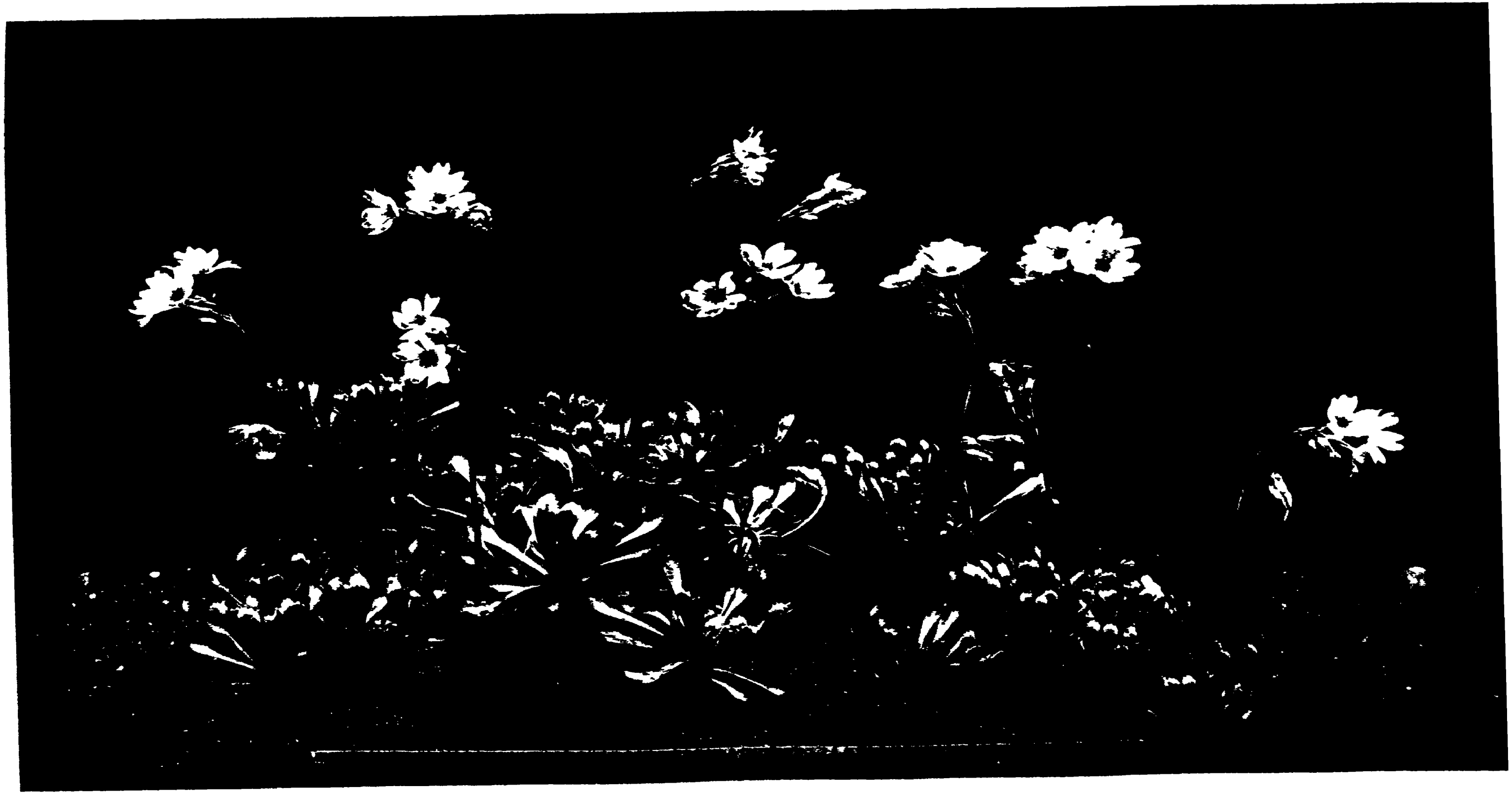


FIG. 16—PRIMULA SUFFRUTESCENS A Gray
(p 23)

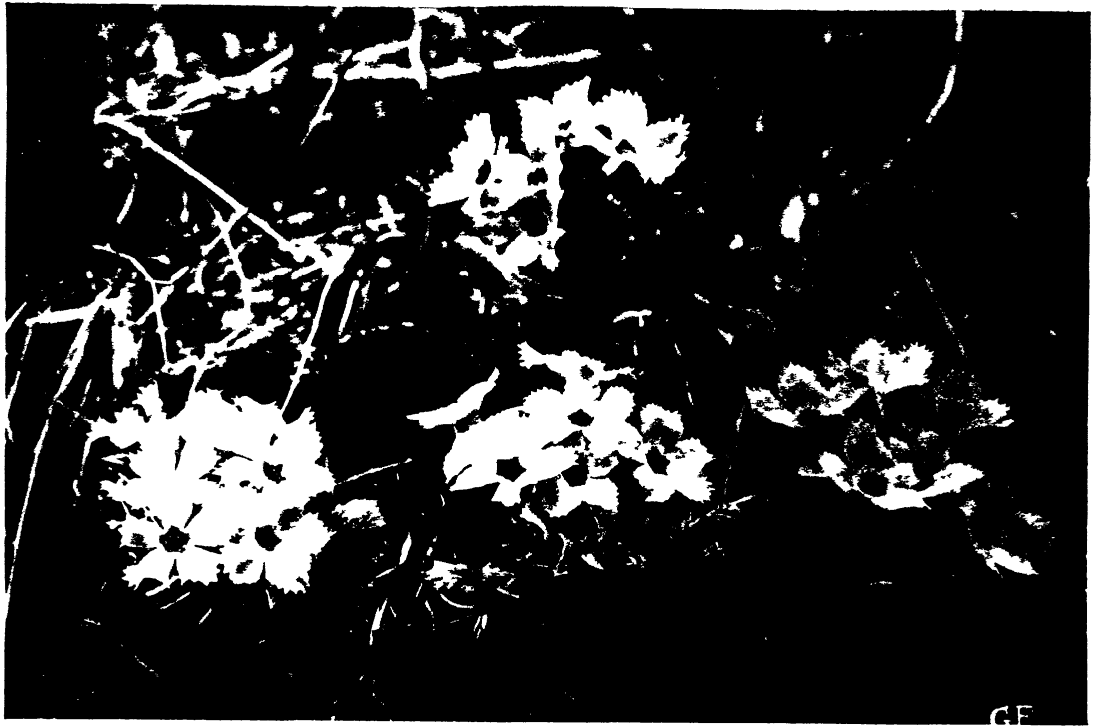


FIG. 17. PRIMULA SONCHIFOLIA Franch.
(Growing in Yunnan.)
¼

To face p. 21

Monograph. The list given below is based, with certain minor changes, on that work. We have not introduced here the many names given to the varieties, forms and hybrids of this section. These must be dealt with in an index to the genus Primula which is in preparation.

As its geographical distribution would indicate, the section Vernales is somewhat isolated and has no near kindred. In its preference for lax hairiness and corresponding lack of farina it resembles Sinenses and its allies, but differs widely from them in the shape and in the lack of lobing of the leaves.

75. P. Juliae, Kusnetzow (fig. 12).
76. P. vulgaris, Huds.
    P. acaulis, Hill.
    Subspecies.
        77. P. balearica, Willkomm.
        78. P. heterochroma, Stapf.
        79. P. Sibthorpii, Hoffmsgg.
80. P. amoena, Bieb.
    Subspecies.
        81. P. Meyeri, Rupr.
82. P. leucophylla, Pax.
    Subspecies.
        83. P. Ruprechtii, Kusnetzow.
84. P. elatior, Schreber (fig. 13).
    Subspecies.
        85. P. carpathica, Fuss.
        86. P. cordifolia, Rupr.
        87. P. intricata, Godr. et Gren.
        88. P. Pallasii, Lehm.
        89. P. pseudoelatior, Kusnetzow.
90. P. veris, Linn.
    P. officinalis, Hill.
    Subspecies.
        91. P. canescens, Opiz.
        92. P. Columnae, Ten.
        93. P. macrocalyx, Bunge.
        94. P. Velenovskyi, Domin.

Section XI.—AMETHYSTINA, Balf. f.

(Figs. 14, 15.)

This is a section containing many very beautiful species but none is in cultivation. Seed has been secured in the past of some four or five but we have seen only one, *P. brevifolia*, brought to flowering stage. That too is now lost. The section is characterized by the horny margin to the leaves, which have a peculiar glandular punctulation, and by the pendent bell-like flowers. The species are quite glabrous, without hairs and generally without farina. The corolla lobes are usually in line with the tube and not bent at right angles as in most

Primulas. *P. Dickieana* and *P. aureostellata* depart from this bell-like corolla, however, though very similar in the nature of their leaves. They are not akin to any other section and are probably best included here. Although the species of this section have been described as efarinose, there is more than a suspicion of farina at the apex of the scape of *P. Faberi* and also of *P. aureostellata* and *P. Dickieana*. There is also a marked tendency to the development of gibbosity in the bracts of *P. Faberi* and *P. aureostellata*. In spite of the difference in corolla shape between these two, they are akin, and if *P. aureostellata* must accompany *P. Faberi* so must also *P. Dickieana*. Another peculiar feature of *P. aureostellata* and *P. Dickieana* is the hairiness of the throat and inner part of the corolla-tube—a feature alien to the other species of Amethystina.

The section is at first sight an isolated one, but if any weight is to be given to the peculiarities noted above as regards farina and gibbosity of bracts there is a suggestion of approach to such species as *P. algida* and consequently a link, perhaps slender, with the all-pervading Farinosae. The species are restricted to the Eastern Himalaya and to S.W. China.

95. P. silaensis, Petitm. (fig. 14).
96. P. argutidens, Franch.
    P. Riae, Pax.
97. P. amethystina, Franch.
    Subspecies.
        98. P. brevifolia, Forrest (fig. 15).
99. P. Virginis, Levl.
    P. leimonophila, Balf. f.
    Subspecies.
        100. P. petrophyes, Balf. f.
101. P. Valentiniana, Hand.-Mzt.
102. P. Kingii, Watt.
    Subspecies.
        103. P. Gageana, Balf. f. et W. W. Sm.
104. P. Faberi, Oliv.
    P. cylindriflora, Hand.-Mzt.
105. P. aureostellata, Balf. f. et Cooper.
106. P. Dickieana, Watt.
    var. chlorops, W. W. Sm.
    var. Pantlingii, (King) W. W. Sm.

Section XII.—CUNEIFOLIA, Balf. f.

(Fig. 16.)

This small but very distinct section of Primula finds its centre in Japan and extends into N.E. Asia and the Rocky Mountains. It is a part of what was included by PAX in his section Macrocarpae. The residue including *P. macrocarpa* itself is referable to Farinosae or to its adjunct the section Souliei.

The section is easily distinguished by the characteristic leaves, of firm texture, often markedly cuneate in shape, with few but regular teeth, recalling in outline the leaves of some of the Geum Saxifrages. The species have been described as efarinose and that is true of the leaves; there is, however, usually on the pedicels and at the apex of the scape a thin covering of minute farinipotent hairs. The section is, therefore, not so completely efarinose as the section Amethystina, with which the consistency and shape of the leaves invite comparison. The two sections differ widely in their floral character.

Cuneifolia is somewhat isolated and its nearest kindred are probably to be found in Farinosae. The only species of which much is known in cultivation is *P. suffrutescens* from the Rocky Mountains, which with its remarkable woody rhizome is fairly amenable to greenhouse cultivation.

107. P. cuneifolia, Ledeb.
    Subspecies.
        108. P. hakusanensis, Franch.
        109. P. heterodonta, Franch.
        110. P. saxifragifolia, Lehm.
111. P. nipponica, Yatabe.
112. P. suffrutescens, A. Gray (fig. 16).

Section XIII.—PETIOLARES, Pax.

(Figs. 3, 17, 18.)

This is a very large assemblage of species confined in their distribution to the Himalaya and the alpine regions of Western China and Tibet. It is a section which presents great difficulties to the cultivator. Only one species—*P. Winteri*—is at all well known in gardens and it is not an easy subject. *P. sonchifolia* lived to flower feebly but is no longer in Europe. It seems necessary that the seed should germinate in a green state as it is resentful of drying. The section contains many fine Primulas, but it will be long ere these become denizens of our gardens. But if *P. Winteri* can be grown, there is no reason to despair of the establishment of some of its relations.

The section Petiolares is comparable in importance to Candelabra, Nivales and Sikkimensis, but is quite distinct from each of these three sections. These sections constitute four distinct developments without transitions or intermingling. The species of Petiolares enumerated below have been arranged in five subsections.

As pointed out by Sir ISAAC BAYLEY BALFOUR the members of the series have in common the "characteristic enlargement of the scape and pedicels in fruit-ripening and for the fruit itself a discoid operculate capsule occupied by a broad convex placenta upon which the seeds lie."

The largest subsection is Petiolaris-Sonchifolia, very fully discussed by Professor CRAIB in *Notes Roy. Bot. Gard. Edin.* vi. (1917), 257. Among the species of this subsection Professor CRAIB indicates seven natural groups. For these groups names (given by BALFOUR in Herb.) have been suggested. The very distinct subsection Davidi is dealt with by CRAIB in *Notes Roy. Bot. Gard. Edin.* xi. (1919), 179. We have included *P. chartacea* and its allies as a subsection touching very closely on Davidi but with a very well defined petiole and more or less orbicular leaf. The peculiar *P. tongolensis* is also of Petiolares type and appears in a special subsection. With it we have associated with some doubt two aberrant species, *P. Clarkei* and *P. pulchra*, which seem to me to favour a Petiolarid connexion. Roylei comes also within Petiolares as a subsection.

Many of the species flower in nature long before Primulas of other sections—Petiolarids have often shed their seed before the other Primulas even come into flower. Much more material, including that of the early stages, is needed before a satisfactory analysis can be made of this complex section. Evidence is given in a recent issue of the *Botanical Magazine* (tab. 9064) that *P. Winteri* and *P. Edgeworthii* are the same, the plant exhibiting an "exquisite seasonal dimorphism—the spring stage being *P. Winteri* and the summer stage *P. Edgeworthii.*"

Subsection Petiolaris-Sonchifolia.

Group Hookeri :

113. P. Hookeri, Watt.
114. P. vernicosa, Ward.

Group Taliensis :

115. P. praticola, Craib.
116. P. taliensis, G. Forrest.

Group Sonchifolia :

117. P. taraxacoides, Balf. f.
118. P. sonchifolia, Franch. (fig. 17).
119. P. Whitei, W. E. Sm.
120. P. chionota, W. W. Sm.
121. P. drymophila, Craib.
122. P. chamaethauma, W. W. Sm.
123. P. calthifolia, W. W. Sm.

Group Edgeworthii :

124. P. Edgeworthii, Pax.
125. P. Winteri, W. Wats. (figs. 3, 18).
126. P. saxicola, Craib.
127. P. nana, Wall.

Group Vera :

128. P. sulphurea, Craib.
129. P. Drummondiana, Craib.
130. P. pseudopetiolaris, Pax et K. Hoffm.
131. P. Cunninghamii, Craib.
132. P. Hoffmanniana, W. W. Sm.
133. P. gracilipes, Craib.

FIG. 18. PRIMULA WINTERI W. Wats.

1/4

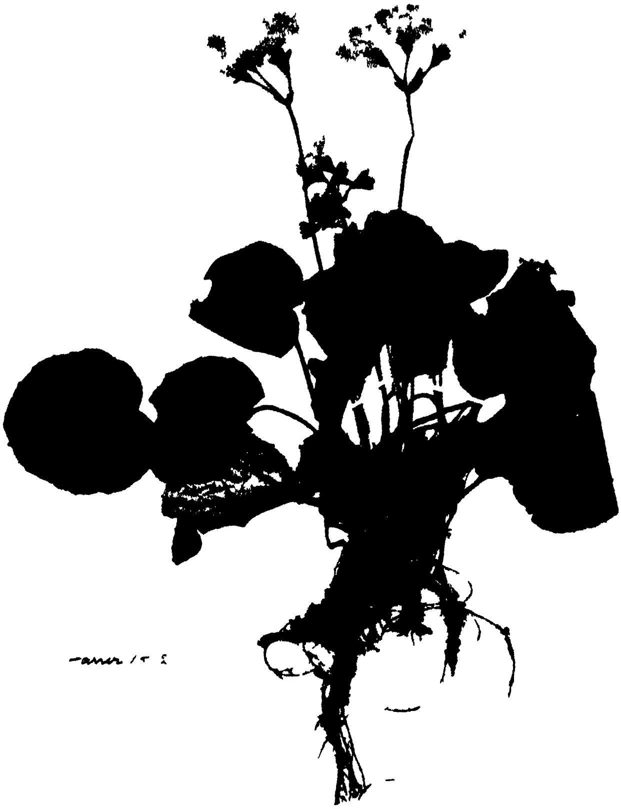


FIG. 19.—PRIMULA LACERATA W. W. Sm.
(½ natural size.) (p. 26)

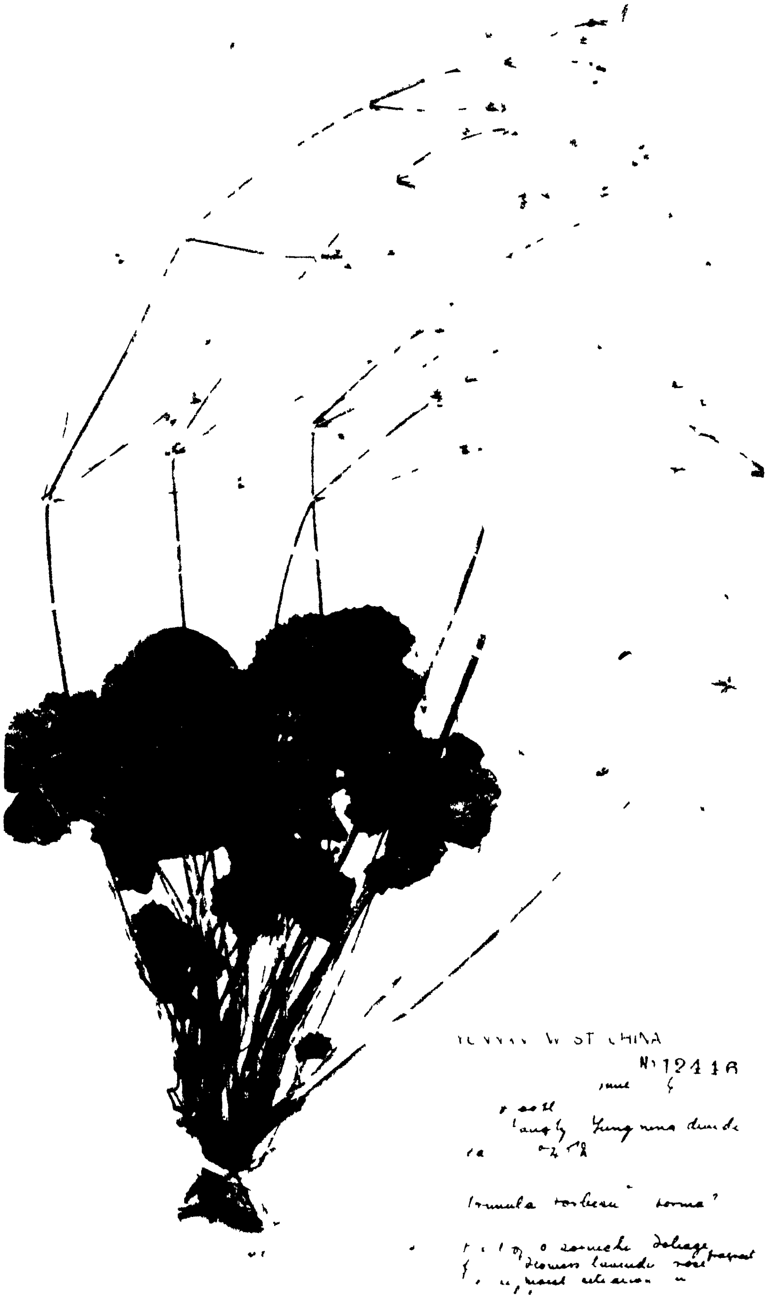


FIG. 20. PRIMULA EFFUSA W. W. Sm. et Forr.
(p. 26)

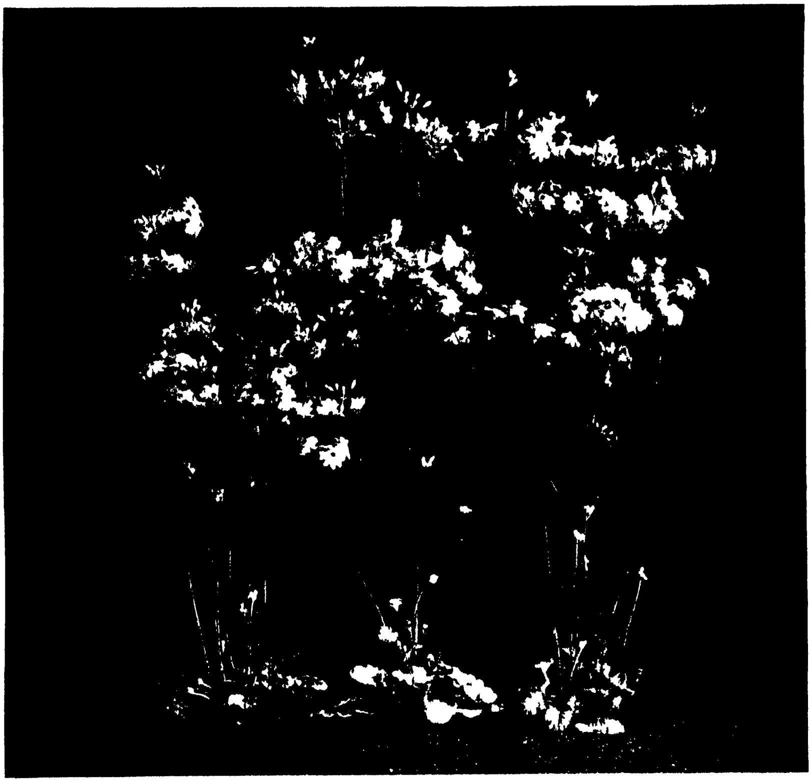


FIG. 21. PRIMULA FORBESII Franch.

(p. [illegible])

FIG. 22.—PRIMULA GRANDIS Trautv.

(p. [illegible])

FIG. 23.—PRIMULA FORRESTII Balf. f.
(A specimen of great age growing in Yunnan.)
(p. 7)

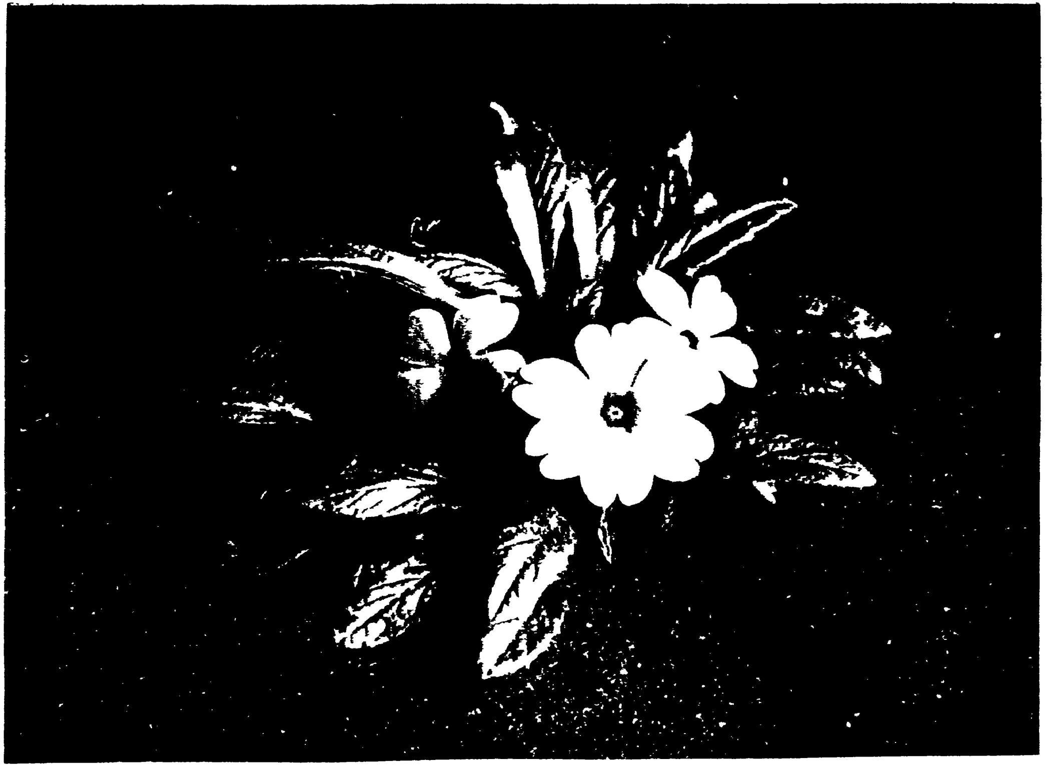
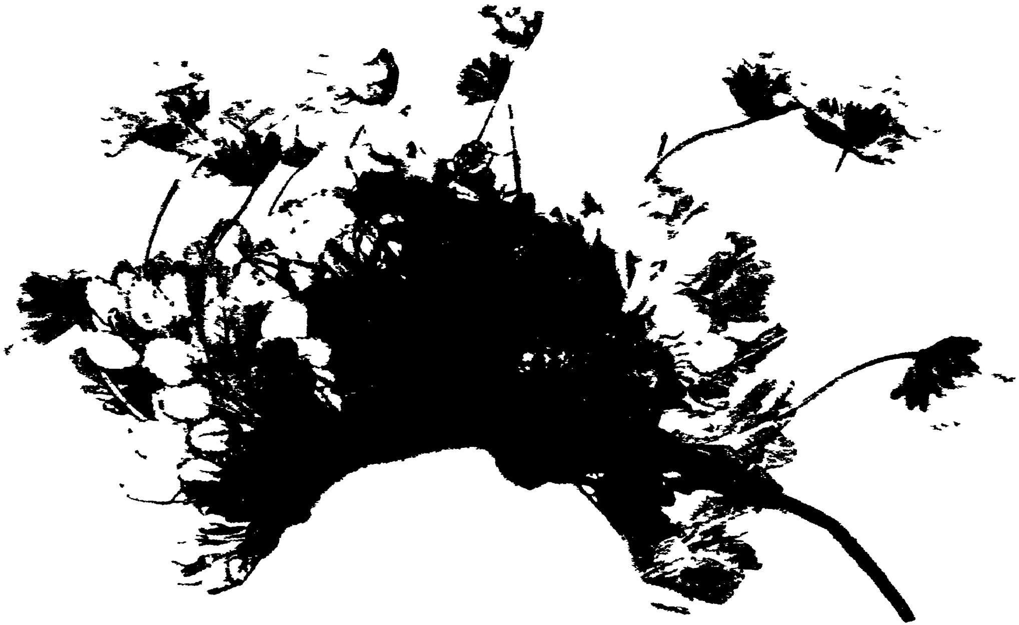


FIG 24—PRIMULA DUBERNARDIANA Forrest

(p 27



[illegible] PRIMULA DRYADIFOLIA Franch

Natural size

[illegible]

134. P. Scullyi, Craib.
135. P. sessilis, Royle.
136. P. deuteronana, Craib.
137. P. petiolaris, Wall.

Group Scapigera :

138. P. irregularis, Craib.
139. P. moupinensis, Franch.
140. P. Boothii, Craib.
141. P. bracteosa, Craib.
142. P. scapigera, Craib.

Group Odontocalyx :

143. P. odontocalyx, Franch.
144. P. hupehensis, Craib.
145. P. sinuata, Franch.
    P. nemoralis, Balf. f.
    P. Ragotiana, Lévl.
146. P. plebeia, Balf. f.
147. P. candidissima, W. W. Sm.
148. P. euosma, Craib.

Subsection Roylei :

149. P. Roylei, Balf. f. et W. W. Sm.
    Subspecies.
    150. P. Calderiana, Balf. f. et Cooper.
    151. P. Dianae, Balf. f. et Cooper.
    152. P. Gammieana, (King mss.) Balf. f.
153. P. Griffithii, Pax.
154. P. Tanneri, King.

Subsection Davidi :

155. P. ovalifolia, Franch.
156. P. polia, Craib.
157. P. Limprichtii, Pax et K. Hoffm.
158. P. macropoda, Craib.
159. P. fagosa, Balf. f. et Craib.
160. P. hylobia, W. W. Sm.
161. P. leptophylla, Craib.
162. P. Klaveriana, G. Forrest.
163. P. coerulea, G. Forrest.
164. P. crassa, Hand.-Mzt.
165. P. aequipila, Craib.
166. P. Davidi, Franch.
167. P. epilosa, Craib.
168. P. breviscapa, Franch.
169. P. Esquirolii, Petitm.
170. P. hylophila, Balf. f. et Farrer.

Subsection Chartacea.

171. P. chartacea, Franch.
172. P. Veitchiana, Petitm.
173. P. pyrolaefolia, Lévl.
174. P. lacerata, W. W. Sm. (fig. 19).

Subsection Tongolensis.

175. P. Clarkei, Watt.
176. P. pulchra, Watt.
177. P. tongolensis, Franch.
    P. Dielsii, Petitm.
    P. gentianoides, W. W. Sm. et Ward.

Section XIV.—MALACOIDES, Balf. f.

(Figs. 20, 21.)

The chief species in this section is *P. malacoides* itself. Of garden interest are also *P. Forbesii* and *P. effusa*. The majority of the others are referable to *P. Forbesii* as subspecies. The members of the section are chiefly habitants of rice-fields and other cultivated areas and show much variation in size in accordance with different conditions of environment. They are short-lived plants, usually seeding freely. The section has affinity with Obconica, but differs in the presence of farina and in the character of the calyx. *P. pellucida* and *P. Cavaleriei* have no farina, however, and their position is somewhat doubtful. They are scarcely of Malacoides aspect and yet they do not appear referable to Obconica.

178. P. Cavaleriei, Petitm.
179. P. pellucida, Franch.
    P. debilis, Bonati.
    P. speluncicola, Petitm.
180. P. malacoides, Franch.
    Subspecies.
        181. P. pseudomalacoides, Stewart.
182. P. effusa, W. W. Sm. et Forrest (fig. 20).
183. P. Forbesii, Franch. (fig. 21).
    Subspecies.
        184. P. androsacea, Pax.
        185. P. Barbeyana, Petitm.
        186. P. delicata, Petitm.
        187. P. Duclouxii, Petitm.
            P. refracta, Hand.-Mzt.
        188. P. hypoleuca, Hand.-Mzt.
        189. P. meiantha, Balf. f. et W. W. Sm.
        190. P. multicaulis, Petitm.
        191. P. Willmottiae, Petitm.

Section XV.—GRANDIS, Balf. f.

(Fig. 22.)

This section contains only one Primula, *P. grandis*, a Caucasus species having a remarkable corolla with a cylindric tube and linear lobes. It is an interesting but not a showy plant. It was introduced into Europe in 1877 and is not difficult to cultivate. It is an isolated type among Primulas and its affinity to other sections is doubtful.

192. P. grandis, Trautv. (fig. 22).

Section XVI.—BULLATAE, Pax.

(Figs. 23, 24.)

The nearest ally of this section is probably Dryadifolia. Both have well-developed, often massive, rhizomes, densely clad with a cushion of withered leaves. In this section the leaves are markedly rugose. To cultivators *P. Forrestii* is well known and is a good representative for the characters of the section. The species fall into two groups. The first comprises species of robust habit, with long scapes, and many-flowered umbels. To this belong *P. bullata*, *P. Forrestii*, *P. rufa*, and *P. redolens*. These are all closely allied and differ in minor points. *P. bullata* is farinose and not glandular-pubescent; leaf-base cuneate. *P. Forrestii* is densely glandular-pubescent, with cordate leaves. *P. rufa* differs from the last in having a cuneate base to the leaf while *P. redolens* is akin to *P. rufa* except in colour of flower—rose and not yellow as in the other three. Except typical *P. bullata*, all are or have been in cultivation.

The other group is of dwarfer habit, with a very short scape (sometimes none), hidden among the leaves. Yellow-flowered are the three closely-allied species (possibly all variations of one), *P. bracteata*, *P. pseudobracteata*, and *P. pulvinata*. *P. Dubernardiana* and *P. tapeina* have white to rose flowers. *P. Henrici* is imperfectly known to us but is certainly near *P. Dubernardiana*, while *P. ulophylla* suggests a dwarf *P. rufa*. Of these last *P. Dubernardiana* is in cultivation and apparently prefers, like *P. Forrestii*, a situation on a wall.

193. P. bullata, Franch.
194. P. Forrestii, Balf. f. (fig. 23).
195. P. rufa, Balf. f.
196. P. redolens, Balf. f. et Ward.
197. P. ulophylla, Hand.-Mzt.
198. P. bracteata, Franch.
199. P. pseudobracteata, Petitm.
200. P. pulvinata, Balf. f. et Ward.
201. P. tapeina, Balf. f. et Forrest.
202. P. Dubernardiana, G. Forrest (fig. 24).
    P. Monbeigii, Balf. f.
203. P. Henrici, Bur. et Franch.

Section XVII.—DRYADIFOLIA, Balf. f.

(Fig. 25.)

This section is a somewhat isolated one. Its habit recalls the Bullatae section but its foliage and flowers are very different. Some of its smaller members such as *P. triloba* invite comparison with section Bella and have been associated with that section. The corolla-tube and throat are sometimes hairy but the characteristic pompon of Bella is absent. We regard it rather as a suffruticose parallel to Minutissimae and Bella and cannot favour the view of FRANCHET, adopted by PAX, of relegating it to section Soldanelloideae. The head of flowers and the bracts of its larger members are certainly suggestive of Soldanelloideae but the leaves and the flower-structure are quite alien to that section. The massive rhizomes covered with the remains of many leaves mark the section easily from all the sections except Bullatae.

P. dryadifolia is rare in cultivation. It is one of the most beautiful of the Primulas but does not take kindly to garden conditions. It seems to do best on a wall as in the case of the Bullatae Primulas. In nature *P. chrysophylla* and *P. dryadifolia* grow on limestone, *P. congestiflora* and *P. cycliophylla* on gneiss and granite.

The last three in the list are very dwarf but are undoubtedly within the section. It is they which indicate a link with section Minutissimae

204. P. dryadifolia, Franch. (fig. 25).
    Subspecies.
        205. P. chrysophylla, Balf. f. et Forrest.
        206. P. congestifolia, G. Forrest.
            P. oreina, Balf. f. et Cooper.
            P. philoresia, Balf. f. et Ward.
        207. P. cycliophylla, Balf. f. et Farrer.
208. P. Jonarduni, W. W. Sm.
209. P. mystrophylla, Balf. f. et Forrest.
210. P. triloba, Balf. f. et Forrest.

Section XVIII.—MINUTISSIMAE, Pax.

(Fig. 26.)

This small section of dwarf high-alpine Primulas is found in the Himalaya and Tibet, with one outlier in Western China. The inflorescence is very reduced, in many cases only a single flower with the shortest of scapes. The species of the section tend to be stoloniferous, forming dense low-growing little mats. The majority are farinose, but the meal is very feebly developed in some. The section can fairly be regarded as a dwarf development from the Farinosae aggregate. The bracts, however, are never of the auriculate type. Their line of contact with the Farinosae runs through *P. yunnanensis* and its allies. The relationship with the little section Bella is also very close. Through *P. tenella* they touch on the Himalayan section

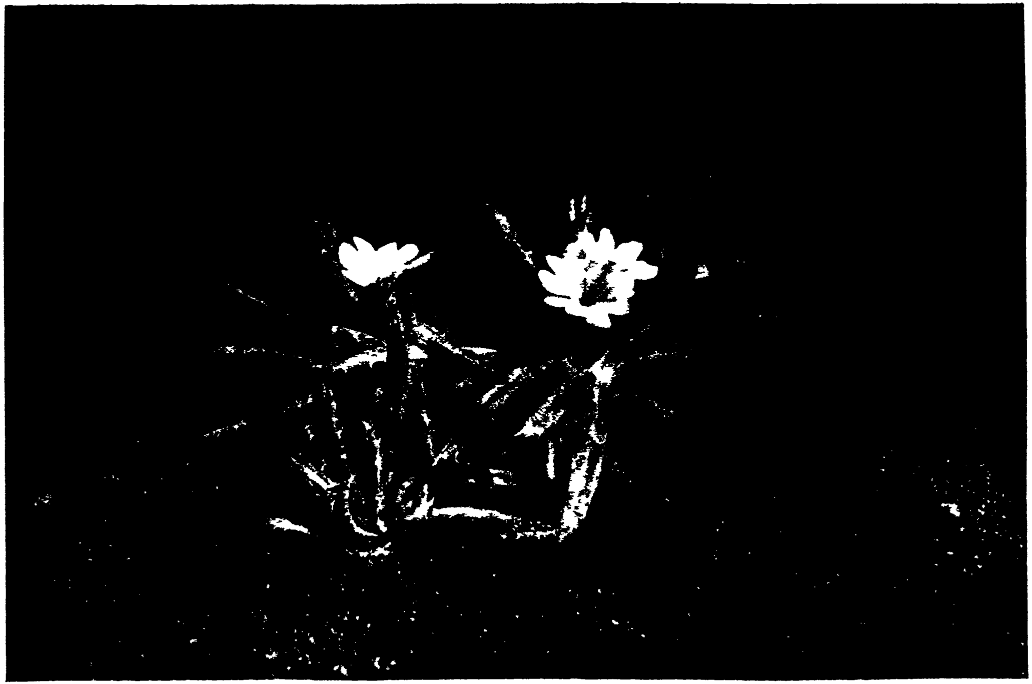


Fig. 26.—Primula Heydei Watt
(Natural size)
(p.29)

[To face p. 28.

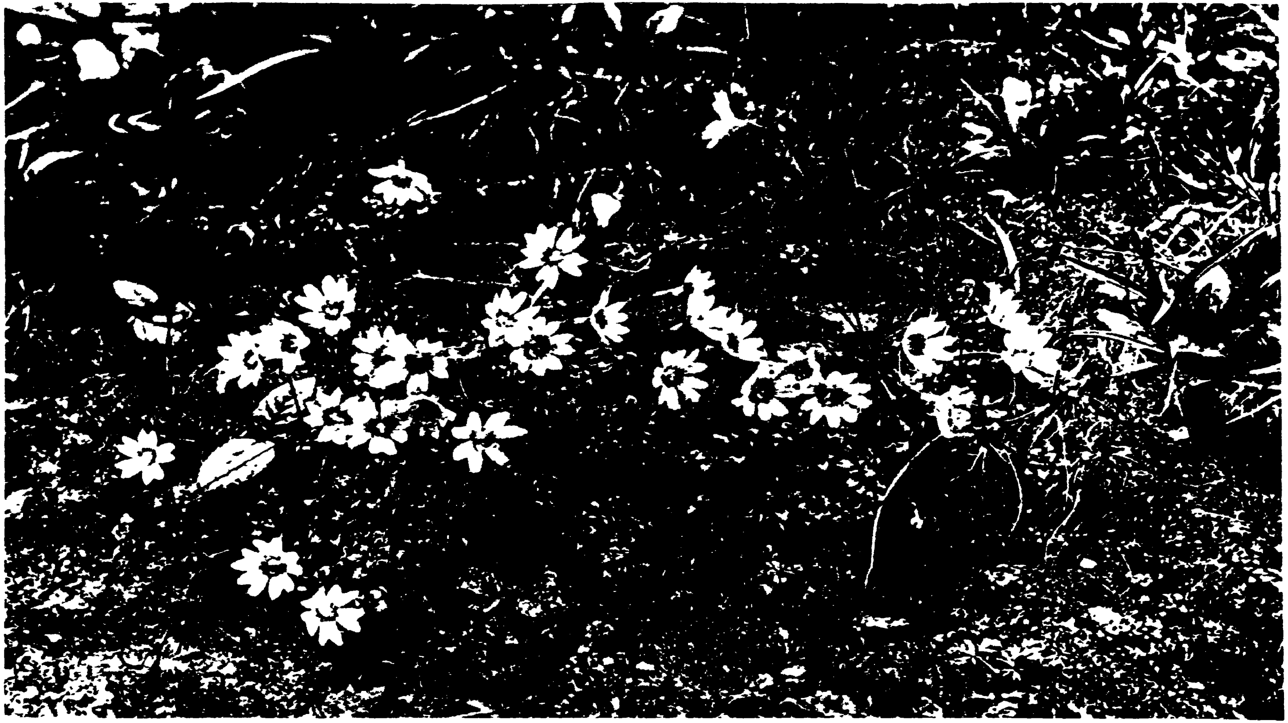


FIG. 27.—PRIMULA BELLA Franch.
(In natural habitat, Yunnan.)
(p. 29

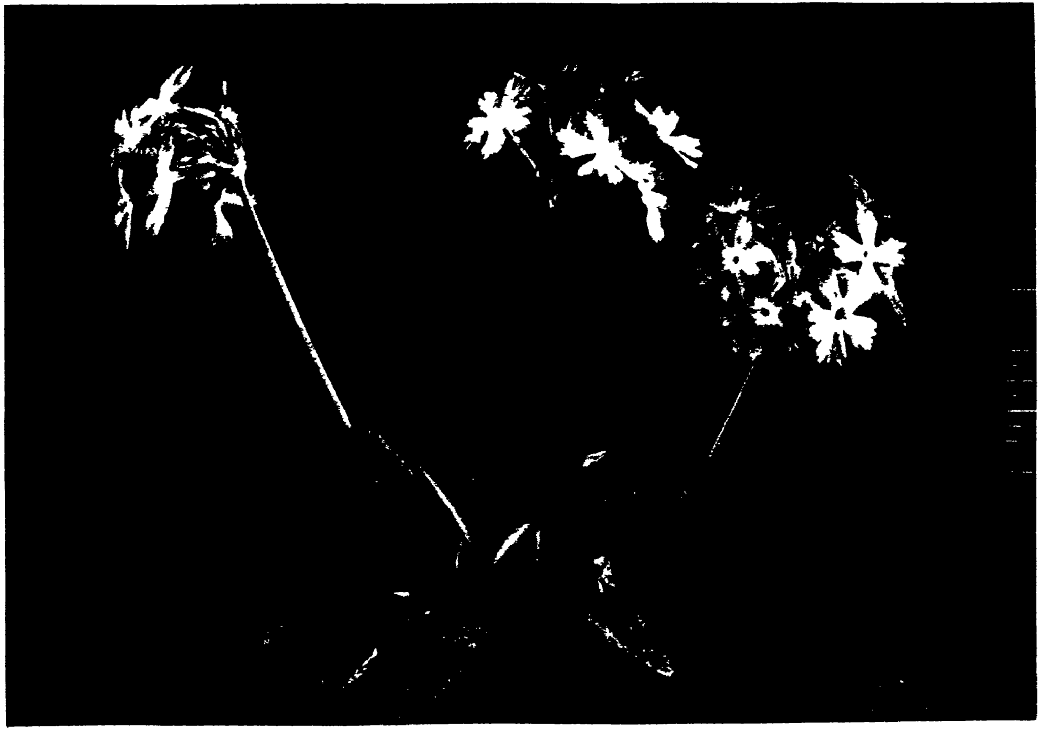


FIG 28.—PRIMULA RUPICOLA Balf f. et Forrest
(p 30)

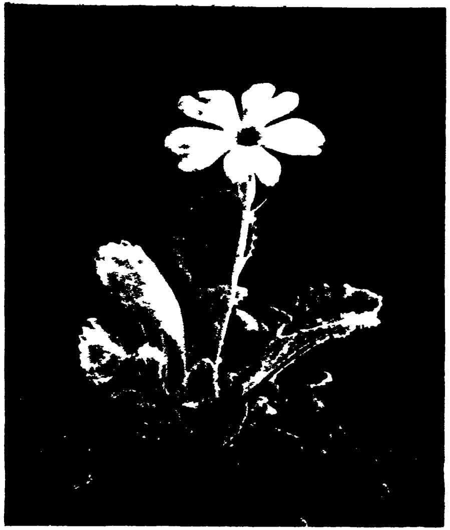


FIG. 29.—PRIMULA TENELLA King
(p. 35

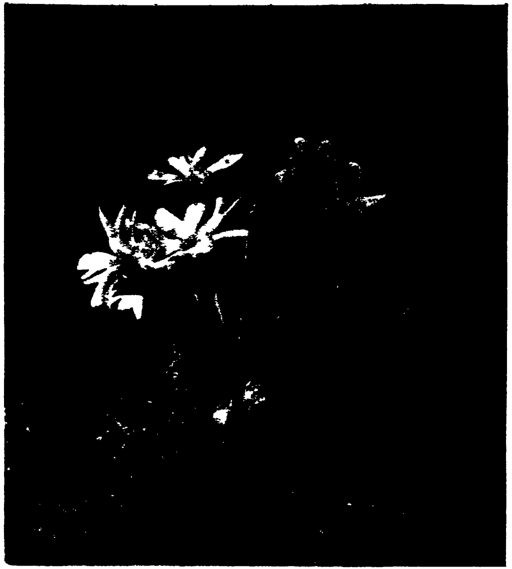


FIG. 30.—PRIMULA URTICIFOLIA Maxim
(p. 30)

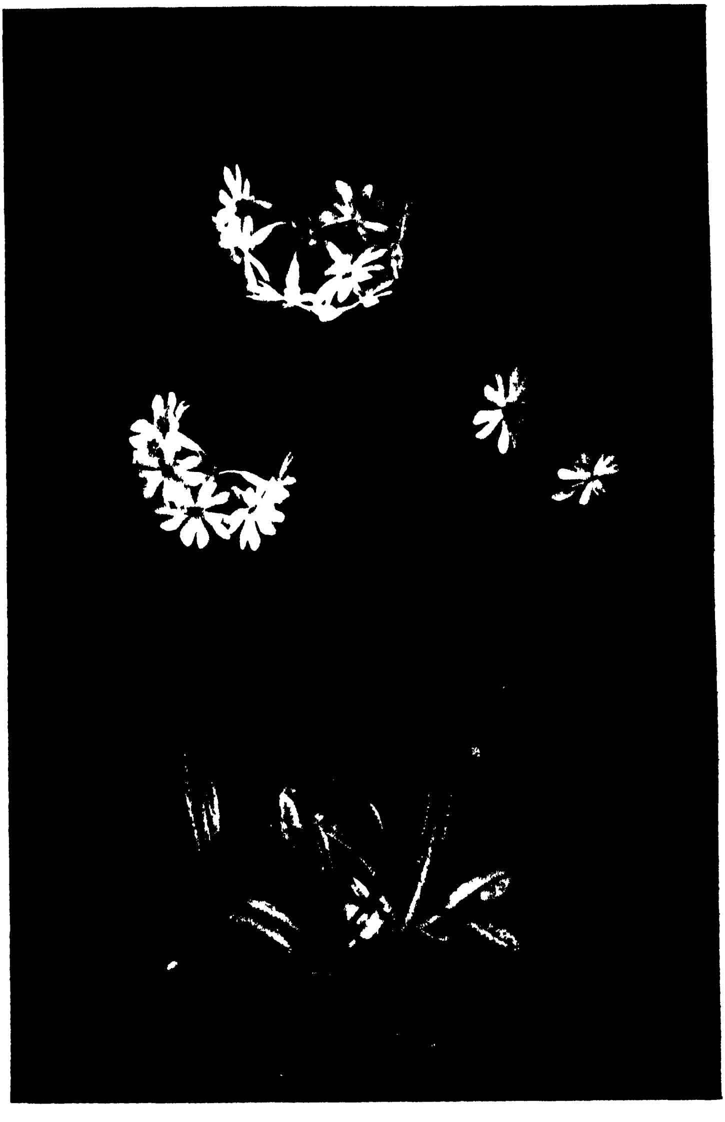


FIG. 31 — PRIMULA FARINOSA Pax
(p 32)

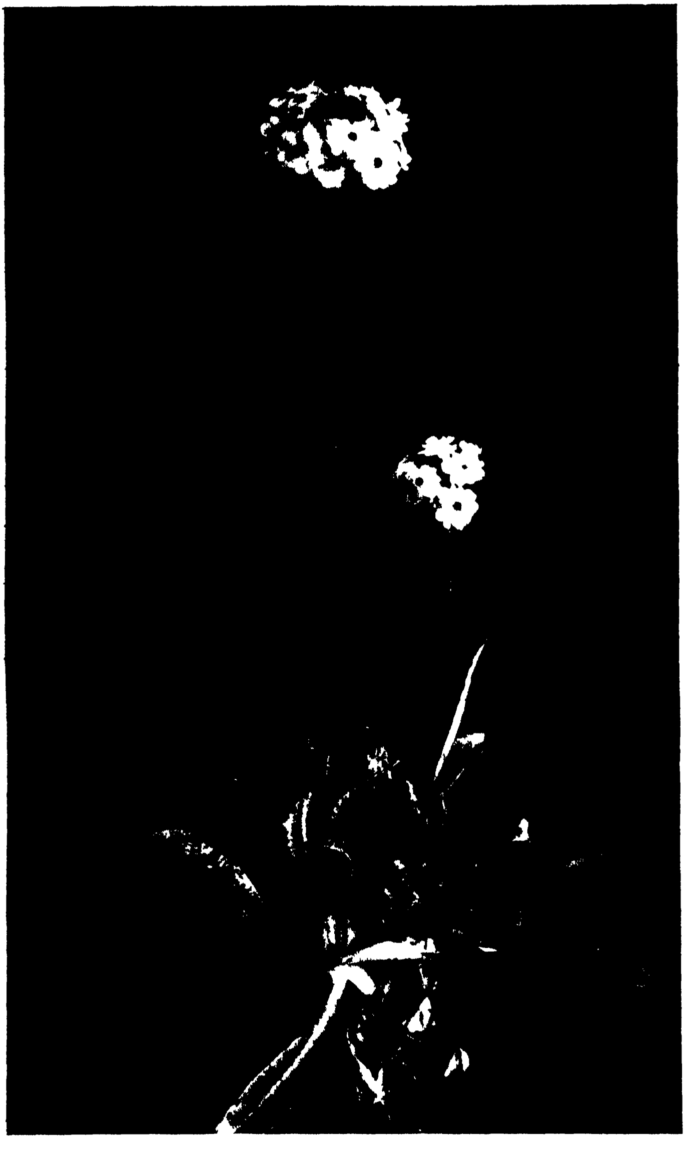


FIG. 32 — PRIMULA CALDARIA W. W. Sm. et Forr.
(p. 32)

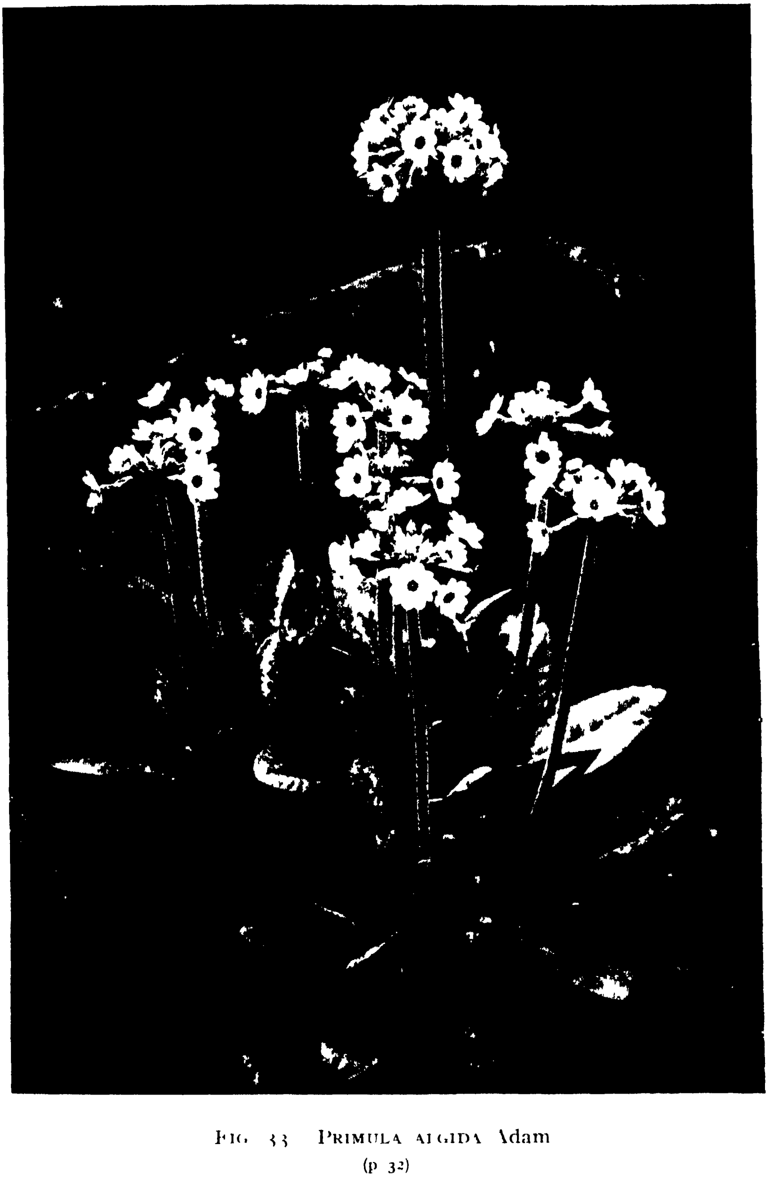


FIG. 33 PRIMULA ALGIDA Adam
(p 32)

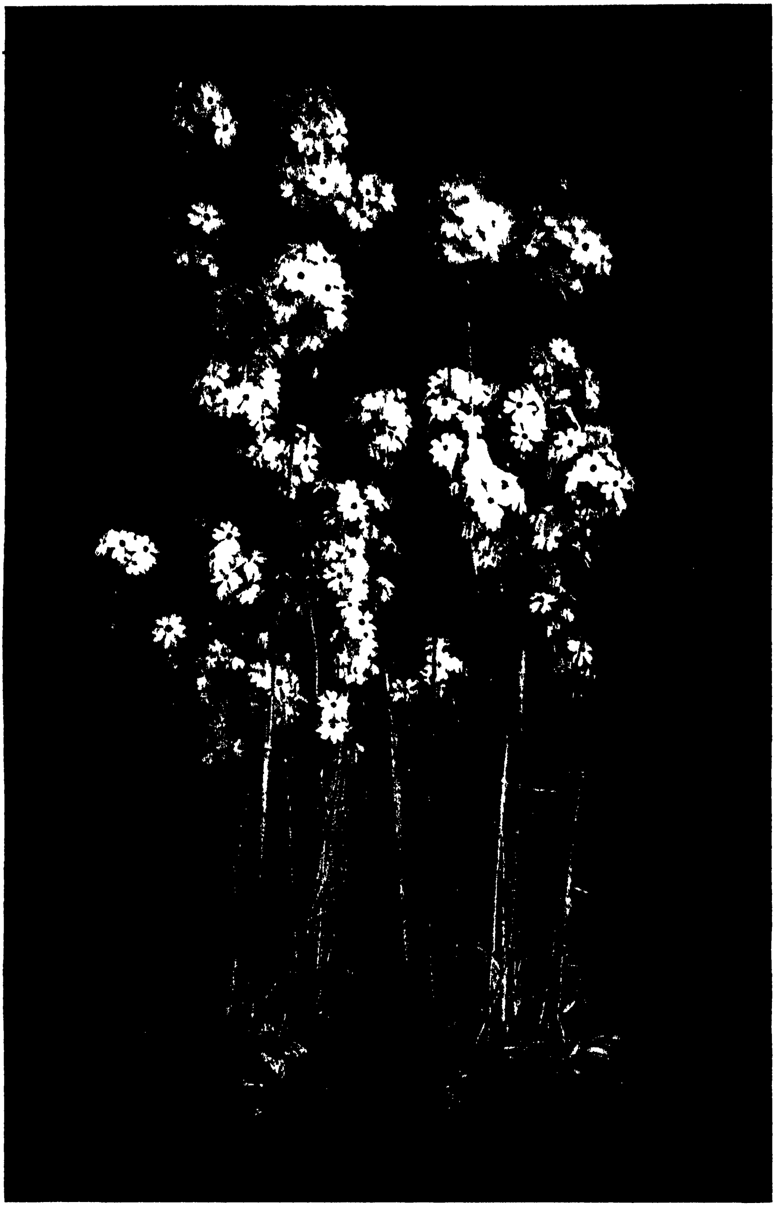


FIG. 34. PRIMULA CONSPERSA Balf. f. et Purd.
(p. 33)

[*To face p.* 29

of Obtusifolia but much less closely. *P. flagellaris* has the most pronounced stolons of any known Primula.

None has been satisfactorily established in cultivation. They are much too small to be of garden interest.

211. P. petrocharis, Pax et K. Hoffm.
212. P. muscoides, Hook. f.
213. P. tenuiloba, (Hook. f.) Pax.
214. P. Waddellii, Balf. f. et W. W. Sm.
215. P. Stirtoniana, Watt.
216. P. glandulifera, Balf. f. et W. W. Sm.
217. P. Heydei, Watt (fig. 26).
218. P. minutissima, Jacquem.
219. P. reptans, Hook. f.
220. P. rhodochroa, W. W. Sm.
221. P. spathulifolia, Craib.
    Subspecies.
        222. P. melichlora, Balf. f. et W. W. Sm.
223. P. flagellaris, W. W. Sm.

Section XIX.—BELLA, Balf. f.

(Figs. 27, 62.)

The affinities of this section are with the smaller species of Farinosae and with Minutissimae. Its members are all dwarf and somewhat delicate. Among the small-growing Primulas, the section Bella is recognizable at once by the dense cushion or pompon of hairs in the throat of the corolla. The spathulate leaves are more or less incised or toothed, and may be farinose or not. They are ultra-alpines but lack the woody rootstock of section Dryadifolia. The two outstanding species are *P. pusilla* of the Himalaya and *P. bella* of S.W. China. Both of these are in cultivation but their hold is precarious. *P. bella* has persisted for several years outside in Wigtownshire.

The remaining members of the section may be regarded as subspecies of *P. bella*. They differ from typical *P. bella* in stature, in size of corolla, in presence or absence of white or yellow meal, and other minor points. *P. stragulata* is the most distinct. *P. oreina*, Balf. f. et Cooper, and *P. triloba*, Balf. f. et Forrest, formerly referred to this section, belong to Dryadifolia.

224. P. pusilla, Wall (fig. 62).
225. P. bella, Franch. (fig. 27).
    Subspecies.
        226. P. Bonatiana, Petitm.
        227. P. coryphaea, Balf. f. et Ward.
        228. P. cyclostegia, Hand.-Mzt.
        229. P. indobella, Balf. f. et W. W. Sm.
        230. P. moscophora, Balf. f. et Forrest.
        231. P. nanobella, Balf. f. et Forrest.
        232. P. sciophila, Balf. f. et Ward.
        233. P. stragulata, Balf. f. et Forrest.

Section XX.—*SOULIEI*, Balf. f.

(Figs. 28, 30.)

This is a small section of closely allied plants and finds its nearest affinity with certain members of the Farinosae. It shows kinship with *P. yunnanensis* and *P. gemmifera.* In a general way the section can be distinguished from the dominant Farinosae by the long and distinct petioles, by the thin texture of the membranous leaves which usually show a fine scabridity on the upper surface while the lamina is moreover either markedly serrate or even deeply and pinnatifidly cut; the bracts of the pendent and usually secund flowers are non-saccate, as in *P. yunnanensis* and *P. gemmifera.* The section shows great variation in the degree of marginal indentation. Thus *P. Souliei* with little serration and *P. incisa* where the cutting is very marked are connected together by a regular series of intermediates, some of which have received specific names.

It is a series containing many beautiful plants and some have been in cultivation—*P. florida* and *P. rupicola*—but they are readily lost, owing to lack of the necessary conditions for seeding as they are usually late to flower—July or September—in their native habitat.

The distribution of the section is chiefly in the Western provinces of China, extending into the Eastern parts of Tibet and the Himalaya.

234. P. Souliei, Franch.
    Subspecies.
        235. P. florida, Balf. f. et Forrest.
        236. P. humilis, Pax et K. Hoffm.
        237. P. Legendrei, Bonati.
            P. parvula, Pax et K. Hoffm.
        238. P. oresbia, Balf. f.
            P. Blinii, Lévl.
239. P. incisa, Franch.
    P. laciniata, Pax et K. Hoffm.
    Subspecies.
        240. P. pectinata, Balf. f. et Forrest.
241. P. rupicola, Balf. f. et Forrest (fig. 28).
242. P. xanthopa, Balf. f. et Cooper.
243. P. urticifolia, Maxim. (fig. 30).

Section XXI.—FARINOSAE, Pax.

(Figs. 31, 32, 33, 34, 63.)

This section has the widest geographical distribution in the genus. It is found throughout the greater part of Europe and Northern Asia, in Japan, in the Himalaya and the western provinces of China, in the Rocky Mountains, in the Arctic and also in the Antarctic. As defined by Pax in his Monograph, it is a very natural assemblage, and the species quoted in his section all come very adequately within the section. For various reasons we have been compelled to add considerably to the list and somewhat to the scope of the section. One of the outstanding characters of the section is the form of the bracts which are either saccately produced at their insertion or markedly gibbous or enlarged at the base. While this is true of the typical members of the section, this bract character gradually becomes less prominent and passes insensibly into forms where the basal thickening is practically absent or very obscure. Consequently there are several instances of contrasted species, indubitably allies, which differ in the gibbosity or non-gibbosity of the bracts. This is illustrated by the addition of *P. yunnanensis* and its allies to the section, for that assemblage has marked affinity with *P. modesta* and thus leads straight to Farinosae. *P. glabra* and its associates are also more satisfactorily placed here. *P. gemmifera* shows less kinship but the alternative is a small allied section for it and its variants. The other additions are chiefly species described since the publication of the Monograph.

The section is a dominant one and shows marked linkage with certain other sections. It is connected with the large section of Nivales through the species assembled under Obtusifolia. *P. glabra* and its allies lead to section Denticulata. It may in the wide sense be held to include the section Souliei—characterized by the more membranous and usually much indented leaves. Through *P. yunnanensis* it touches on the small section Bella. Some members of the section Minutissimae may well be dwarf representatives of allies in Farinosae.

On the whole the section is not easy for the cultivator, and few of its members are retained long in gardens. The most amenable are probably *P. involucrata* and *P. rosea*.

244. P. annulata, Balf. f. et Ward.
245. P. kialensis, Franch.
    P. scopulorum, Balf. f. et Farrer.
246. P. yunnanensis, Franch.
    P. calcicola, Balf. f. et Forrest.
    P. kichanensis, Petitm.
    Subspecies.
        247. P. fragilis, Balf. f. et Ward.
248. P. Umbrella, G. Forrest.
    P. maikhaensis, Balf. f. et Forrest.
249. P. membranifolia, Franch.
250. P. flava, Maxim.
    Subspecies.
        251. P. citrina, Balf. f. et Purdom.
252. P. stenocalyx, Maxim.
    P. Biondiana, Petitm.
    P. cognata, Duthie.
    P. kanseana, Pax et K. Hoffm.
    P. leptopoda, Bur. et Franch.
    P. Loczii, Kanitz.
253. P. blandula, W. W. Sm.

254. P. macrocarpa, Maxim.
255. P. sertulum, Franch.
256. P. efarinosa, Pax (fig. 31).
257. P. Knuthiana, Pax.
258. P. caldaria, W. W. Sm. et Forrest (fig. 32).
259. P. modesta, Bisset et Moore.
    Subspecies.
        260. P. ajanensis, E. Busch.
        261. P. Fauriei, Franch.
        262. P. yuparensis, Takeda.
263. P. farinosa, Linn.
    Subspecies.
        264. P. davurica, Spreng.
        265. P. exigua, Velen.
        266. P. fistulosa, S. Turk.
        267. P. Hornemanniana, Lehm.
        268. P. incana, M. E. Jones.
            P. americana, Rydb.
        269. P. intercedens, Fernald.
        270. P. intermedia, Sims.
            P. longiscapa, Ledeb.
        270*a*. P. laurentiana, Fernald.
        271. P. magellanica, Lehm.
            P. decipiens, Duby.
        272. P. mistassinica, Michx.
        273. P. scotica, Hook.
        274. P. specuicola, Rydb.
275. P. stricta, Hornem.
276. P. baldschuanica, Fedtsch.
277. P. longiflora, All.
278. P. algida, Adam (fig. 33).
    Subspecies.
        279. P. caucasica, C. Koch.
280. P. borealis, Duby.
    Subspecies.
        281. P. parvifolia, Duby.
            P. Chamissonis, E. Busch.
282. P. frondosa, Janka.
283. P. darialica, Rupr.
    Subspecies.
        284. P. farinifolia, Rupr.
285. P. capitellata, Boiss.
286. P. luteola, Rupr.
287. P. auriculata, Lamk.
    var. calva, Hausskn. et Bornm.
        P. Olgae, Regel.
288. P. flexuosa, S. Turk.
289. P. elliptica, Royle.

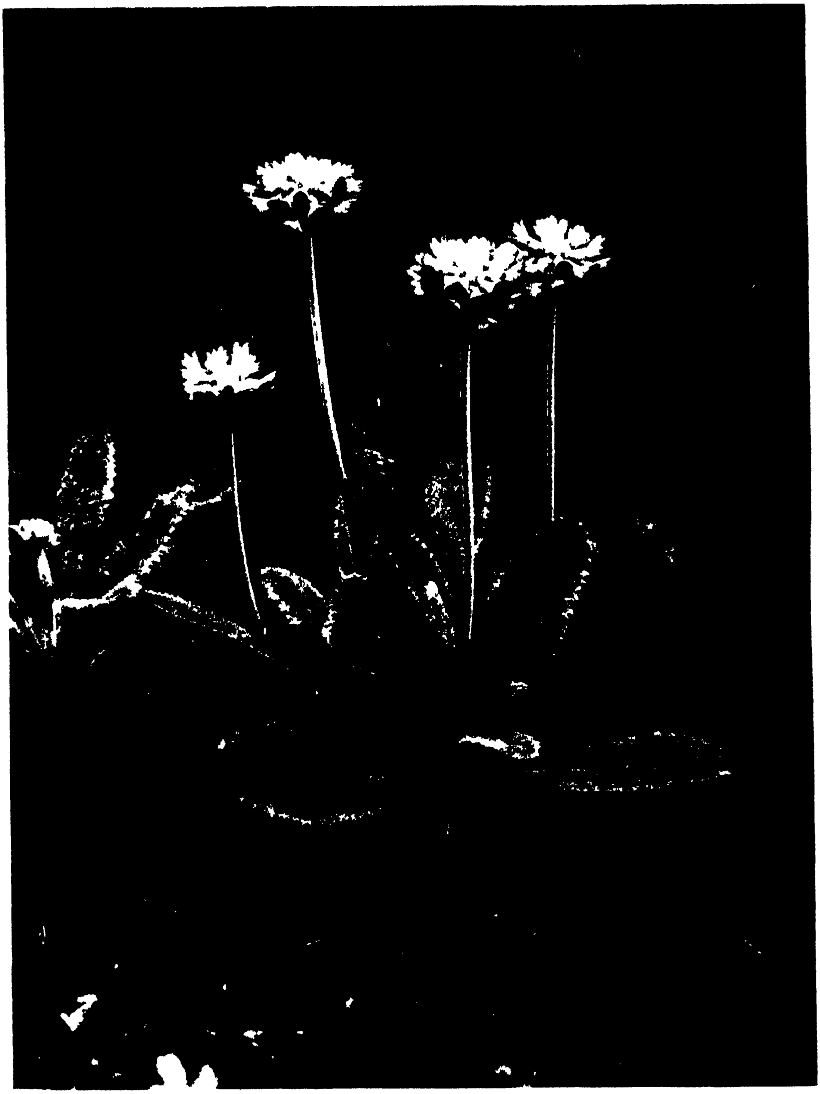


FIG. 35—PRIMULA CAPITATA Hook

(p. 35)

[*To face p.* 32.

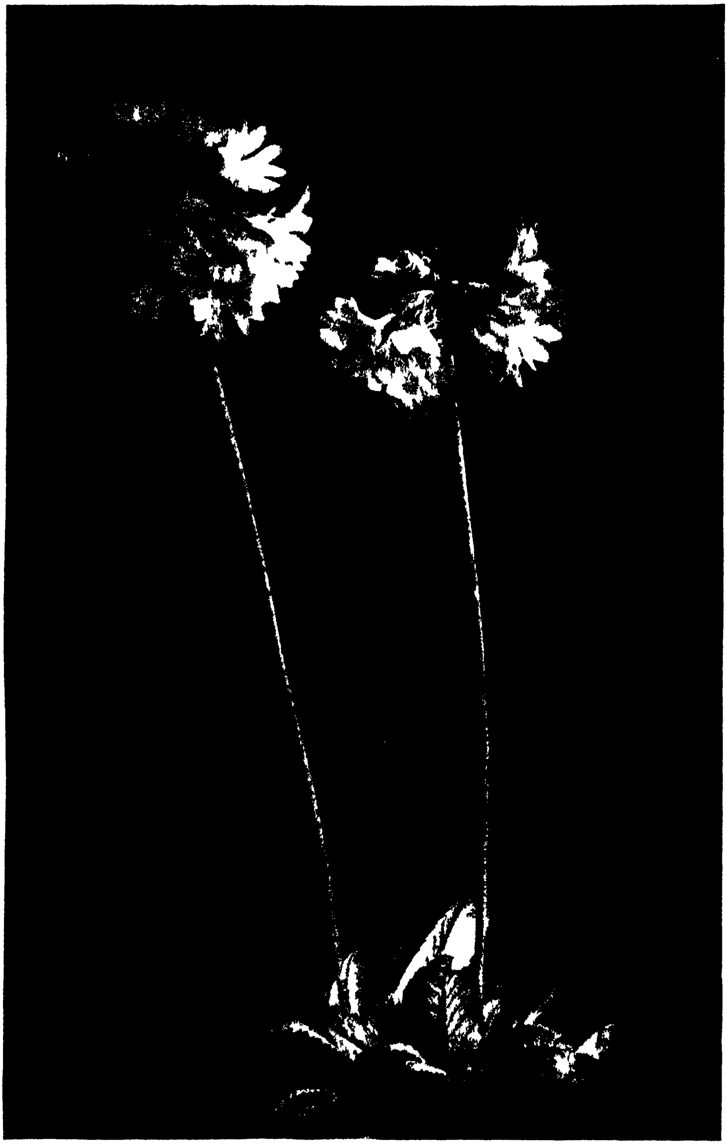


FIG. 36. PRIMULA AERINANTHA Balf. f. et Purd.
(p. 36)

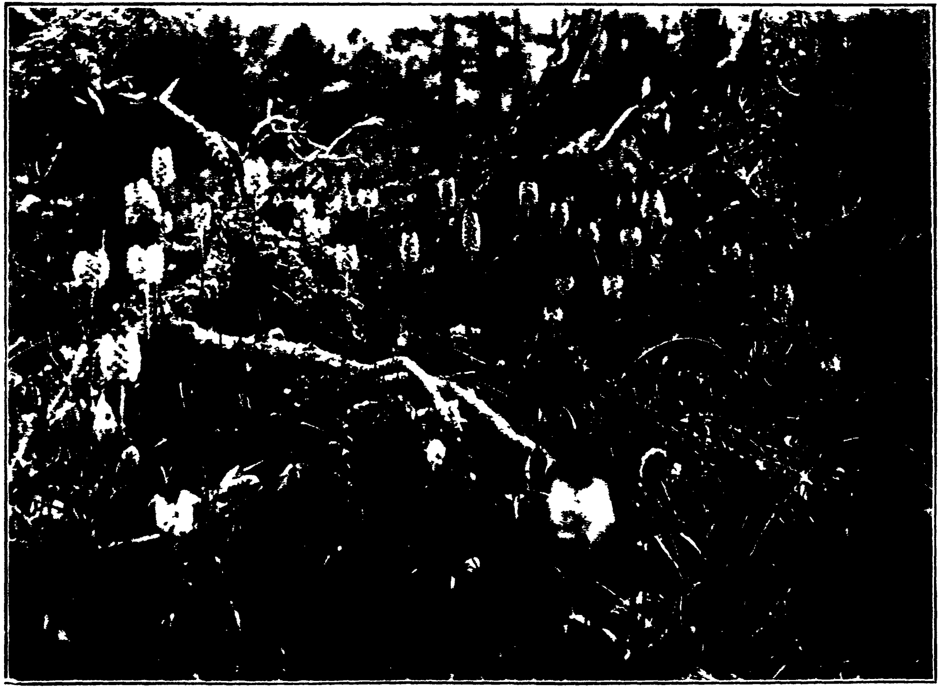


FIG. 37.—PRIMULA LITTONIANA G FORR

(In its natural habitat)

(p. 36)

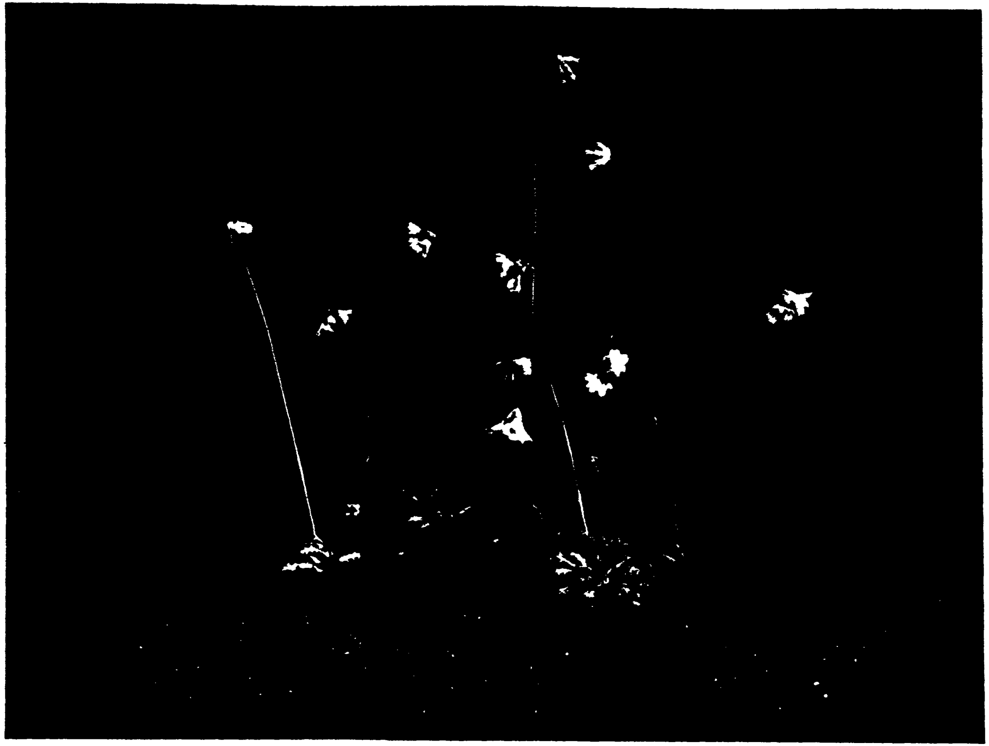


FIG 38.—PRIMULA SAPPHIRINA Hook. f
(p. 37

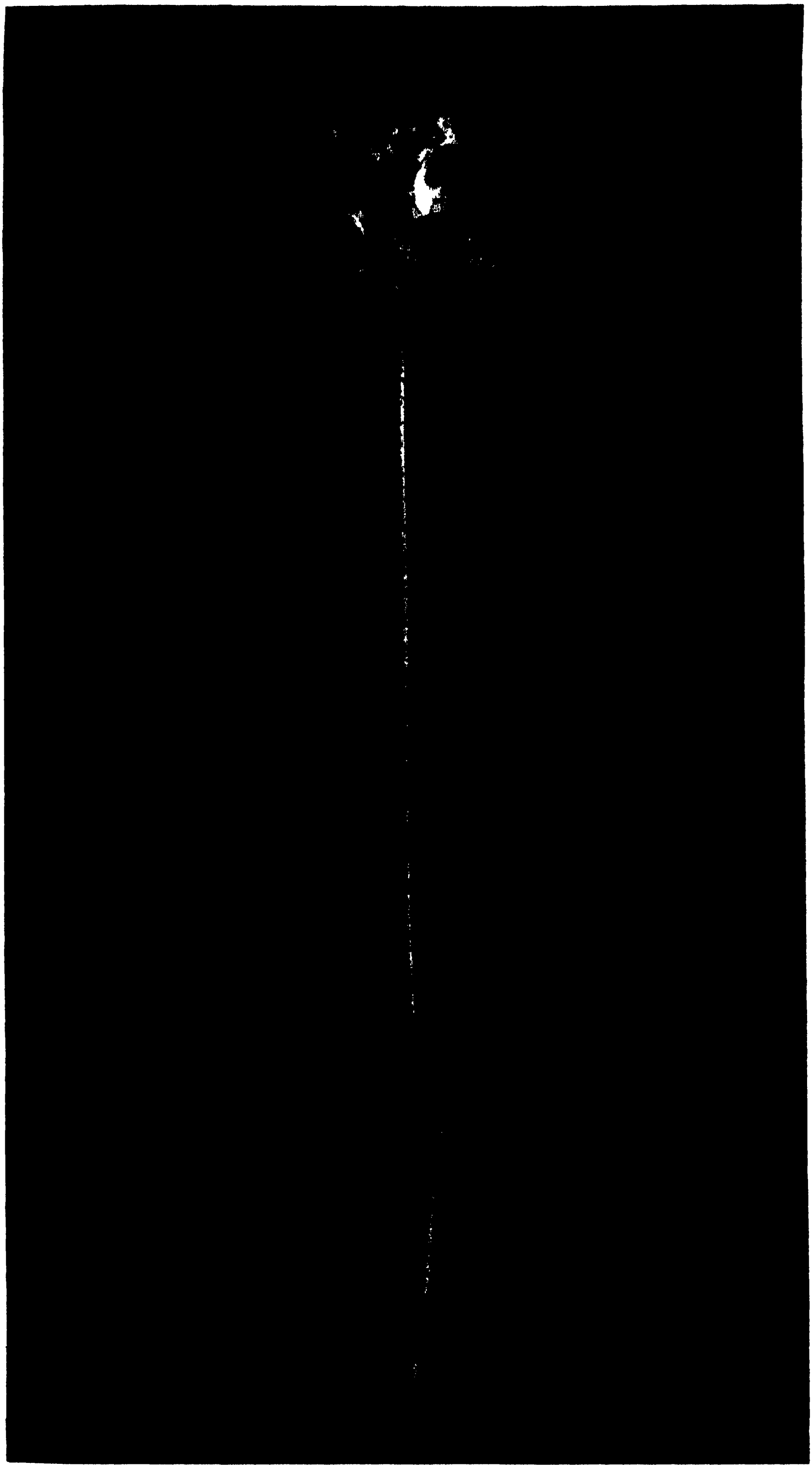


FIG. 39—PRIUMLA NUTANS Franch

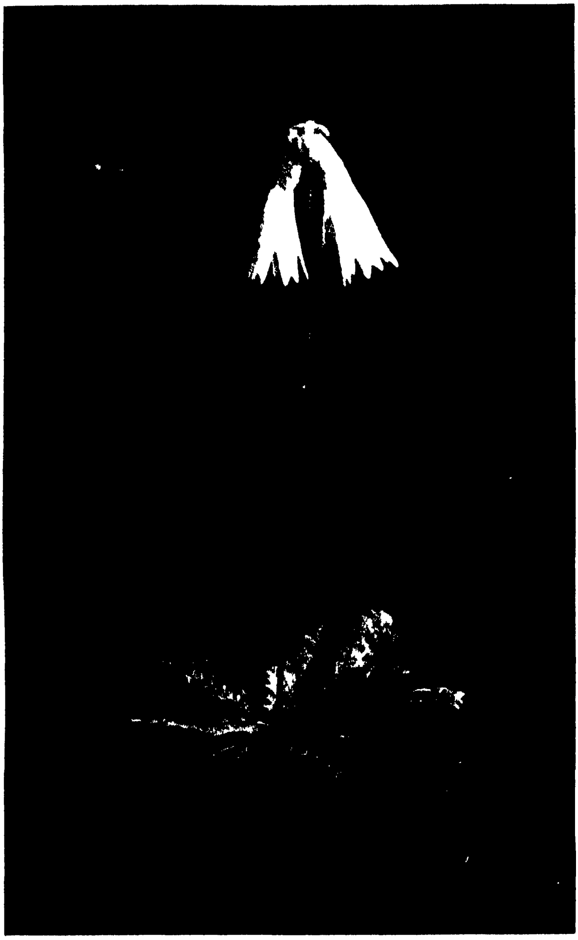


FIG. 40.—PRIMULA CAWDORIANA Ward.

(p. 37)

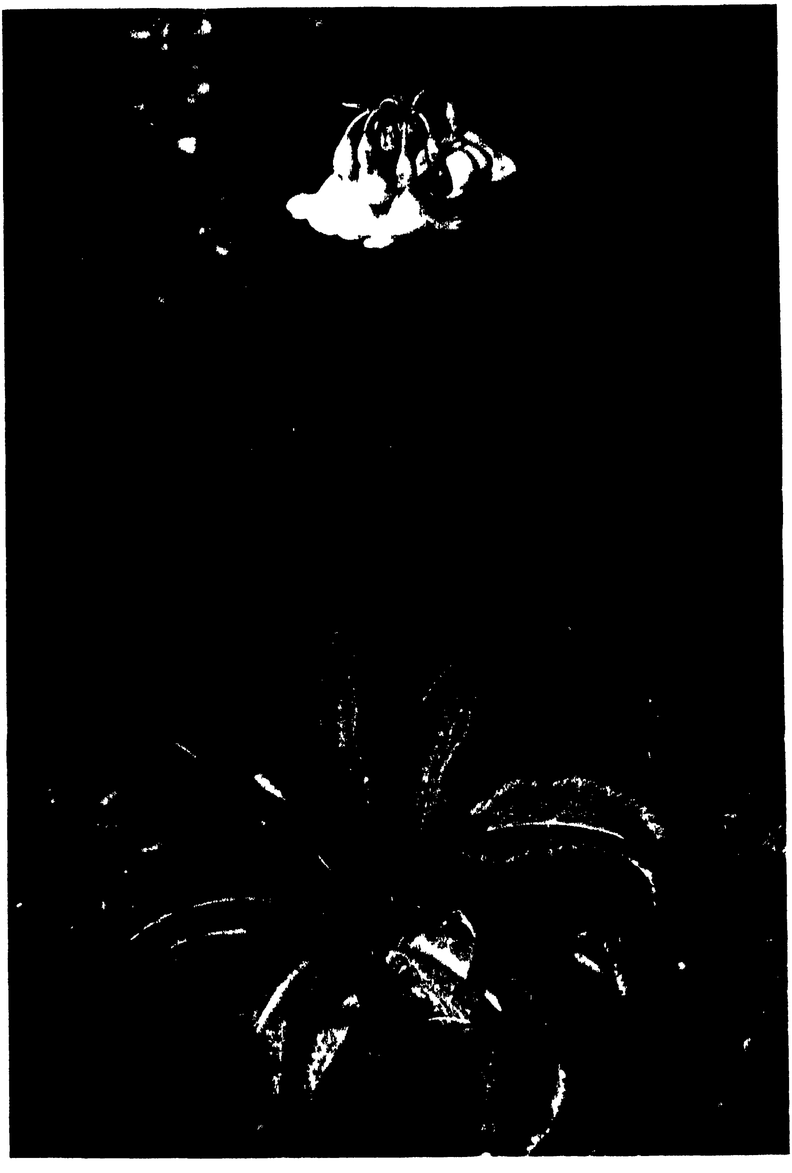


FIG 41 PRIMULA AGLENIANA Balf f et Forr

(p 40

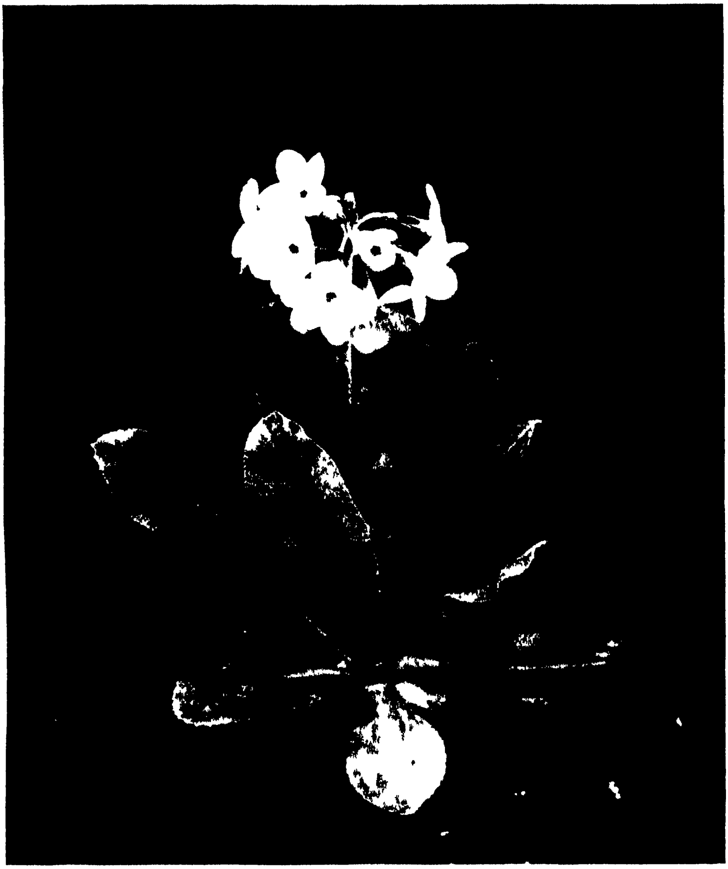


FIG. 42.—PRIMULA SINOPURPUREA

(p. 4)

[To face p. 33

290. P. ossetica, Kusnetzow.
291. P. rosea, Royle.
    Subspecies.
        292. P. elegans, Duby.
        293. P. Harrissii, Watt.
        294. P. radicata, Balf. f. et W. W. Sm.
        295. P. rhodantha, Balf. f. et W. W. Sm.
        296. P. rosiflora, Balf. f. et W. W. Sm.
        297. P. Warshenevskiana, B. Fedt.
298. P. tanupoda, Balf. f. et W. W. Sm.
299. P. Licentii, W. W. Sm. et Forrest.
300. P. gemmifera, Batal.
    P. Hemsleyi, Petitm.
    Subspecies.
        301. P. chrysopa, Balf. f. et Forrest.
        302. P. conspersa, Balf. f. et Purdom (fig. 34).
        303. P. monantha, W. W. Sm. et Forrest.
        304. P. rupestris, Pax et K. Hoffm.
        305. P. zambalensis, Petitm.
            P. carnosula, Balf. f. et Forrest.
306. P. sibirica, Jacq.
307. P. egaliksensis, Wormskiold.
308. P. involucrata, Wall.
    Subspecies.
        309. P. yargongensis, Petitm. (fig. 63).
            P. Wardii, Balf. f.
310. P. tibetica, Watt.
311. P. Reginella, Balf. f.
312. P. fasciculata, Balf. f. et Ward.
313. P. oxygraphidifolia, W. W. Sm. et Ward.
314. P. concinna, Watt.
315. P. pumilio, Maxim.
316. P. Walshii, Craib.
317. P. pygmaeorum, Balf. f. et W. W. Sm.
318. P. kongboensis, W. W. Sm.
319. P. Genestieriana, Hand.-Mzt.
    P. doshongensis, W. W. Sm.
320. P. pseudoglabra, Hand.-Mzt.
321. P. glabra, Klatt.

Section XXII.—DENTICULATA, Balf. f.

(Fig. 64.)

The position of this section is between Farinosae and Capitatae. It is connected with the former through *P. glabra* and its allies and no very definite line can be drawn between the two sections. The inflorescence is usually a dense many-flowered head, the flowers being sessile or shortly pedicelled and tending to be erect. This latter character distinguishes the section from Capitatae and its ally Muscarioides, where the flowers are pendent. Among the Farinosae those species with subsessile flowers have usually saccate bracts, and these are not a feature of Denticulata.

The species listed in the section all centre round *P. denticulata* itself, many deviating from it in comparatively minor points. How far some of them are only geographical forms of the Himalayan species it is difficult to say without further knowledge of their behaviour in cultivation. As a garden plant *P denticulata* is well known and it is usually grown without difficulty. Its allies should also prove quite amenable, but few of them are likely to prove serious rivals in the estimation of the horticulturist. *P. cachemiriana*, Munro, only known in cultivation and no doubt of garden origin, belongs to this section.

The distribution of the section is chiefly Himalayan extending into Tibet and the alpine areas of Szechwan and Yunnan, as well as of Northern Burma.

322. P. Schlagintweitiana, Pax.
323. P. atrodentata, W. W. Sm. (fig. 64).
    Subspecies.
        324. P. orestora, Craib et Cooper.
325. P. glomerata, Pax.
326. P. alta, Balf. f. et Forrest.
    Subspecies.
        327. P. limnoica, Craib.
328. P. denticulata, Sm.
    Subspecies.
        329. P. cyanocephala, Balf. f.
        330. P. erythrocarpa, Craib.
        331. P. Harsukhii, Craib.
        332. P. Hoffmeisteri, Klotzsch.
        333. P. paucifolia, Craib.
        334. P. sinodenticulata, Balf. f.
        335. P. stolonifera, Balf. f.
336. P. crispa, Balf. f. et W. W. Sm.
337. P. erosa, Wall.
338. P. aequalis, Craib.
339. P. platycrana, Craib.
340. P. pseudodenticulata, Pax.
    Subspecies.
        341. P. polyphylla, (Franch.) Petitm.

Section XXIII.—CAPITATAE, Pax.

(Fig. 35.)

The section is here restricted to *P. capitata* and its subspecies. It lies between the sections Denticulata and Muscarioides. In Denticulata the flowers are more or less erect; in the other two sections they are pendent. The inflorescence in Muscarioides is more in the nature of a spike; in Capitatae a round head. The three sections tend to run one into the other, but it is worth while emphasizing the three divisions. In nature as well as in cultivation Denticulata flowers much earlier than Capitatae. This is particularly well marked in the Himalaya where they often occupy the same areas. The section extends into Tibet and S.W. China. *P. capitata* is now well known in cultivation and specially valued as a late flowerer.

All the described plants of this section can be grouped round *P. capitata* as a centre. They differ somewhat in habit, in degree of mealiness, in the dentation of the leaves and in size of truss and of flower. These distinctions are observable in the cultivated plants but transitions are numerous.

342. P. capitata, Hook. (fig. 35).
  Subspecies.
    343. P. Craibeana, Balf. f. et W. W. Sm.
    344. P. crispata, Balf. f. et W. W. Sm.
    345. P. lacteocapitata, Balf. f. et W. W. Sm.
    346. P. Mooreana, Balf. f. et W. W. Sm.
    347. P. sphaerocephala, Balf. f. et W. W. Sm.
      P. pseudocapitata, Ward.

Section XXIV.—MUSCARIOIDES, Balf. f.

(Figs. 36, 37.)

The section Muscarioides comes very near to Capitatae and there is probably no clear line of division between the two sections. *P. capitata* and its allies form a massive round head of flowers while the inflorescence in Muscarioides is more of a spike—sometimes as in the giant form of *P. Littoniana* it may be over one foot in length, apart from the scape. The corolla is very similar in the two sections as regards shape and proportion of tube to limb. From Soldanelloideae the section is discriminated by the corolla shape. In Soldanelloideae the corolla forms a bell, with an amplified limb; the lobes are not bent at an angle with the tube while the insertion of the stamens is always low down in the true tube which is usually much abbreviated.

The section is distributed over the Eastern Himalaya, Tibet and the provinces of Western China. There has been and still is uncertainty as to the limits of the described species. The study of these in cultivation has served to clear up some points. The species are not so easy of cultivation as *P. capitata* but cannot be termed difficult. The best is *P. Littoniana* which may be a large form of *P. Viali*. Of merit are also *P. muscarioides*, *P. pinnatifida*, *P. Menziesiana*, *P. lepta*, *P. cernua*, which are all in cultivation. *P. apoclita*, *P. bellidifolia*, *P. cyanantha*, *P. deflexa*, *P. gracilenta*, *P Watsoni* have also been flowered in this country.

348. P. cernua, Franch.
349. P. Menziesiana, Balf. f. et W. W. Sm.

350. P. gracilenta, Dunn.
351. P. bellidifolia, King.
    Subspecies.
        352. P. adenantha, Balf. f. et Cooper.
        353. P. atricapilla, Balf. f. et Cooper.
354. P. euchaites, W. W. Sm.
355. P. micropetala, Balf. f. et Cooper.
356. P. violacea, W. W. Sm. et Ward.
357. P. lepta, Balf. f. et Forrest.
358. P. pinnatifida, Franch.
    Subspecies.
        359. P. apoclita, Balf. f. et Forrest.
        360. P. cephalantha, Balf. f.
            P. Mairei, Lévl.
361. P. muscarioides, Hemsl.
    P. tsarongensis, Balf. f. et Forrest.
    Subspecies.
        362. P. conica, Balf. f. et Forrest.
363. P. aerinantha, Balf. f. et Purdom (fig. 36).
364. P. Giraldiana, Pax.
365. P. deflexa, Duthie.
366. P. Watsoni, Dunn.
    Subspecies.
        367. P. cyanantha, Balf. f. et Forrest.
368. P. Viali, Franch.
369. P. Littoniana, G. Forrest (fig. 37).

Section XXV.—SOLDANELLOIDEAE, Pax.

(Figs. 38, 39, 40, 65.)

This section comes close to Muscarioides but differs markedly in the form of the corolla. The inflorescence is either capitate or shortly spicate. The corolla is bell-shaped without reflection of the lobes. The tube is usually short, but, above the tube proper, the limb is amplified in campanulate fashion. The bell-shaped corolla suggests association with the Amethystina section, but the leaves of this latter section are very different and the flowers pedicelled.

The distribution embraces the Himalaya, Tibet, S.W. China, and Siam. Closely allied as they may be to Muscarioides, the members of the section are much less amenable to garden conditions. *P. nutans* has flowered and seeded outside but requires much care. *P. Reidii* is one of the most beautiful of Primulas in cultivation, but few gardeners hazard it outside. The following have flowered in this country but are probably lost meanwhile—*P. chasmophila*, *P. eburnea*, *P. Cawdoriana*, *P. sapphirina*, *P. soldanelloides*, *P. spicata*, *P. siamensis*, *P. uniflora*, and *P. Wattii*. All are high alpines with a six months' winter. The section contains several species of great beauty and grace.

370. P. soldanelloides, Watt.
371. P. sapphirina, Hook. f. (fig. 38).
372. P. fea, Ward.
373. P. Fargesii, Franch.
374. P. spicata, Franch.
375. P. siamensis, Craib.
376. P. nutans, Franch. (fig. 39).
    Subspecies.
        377. P. penduliflora, (Franch.) Petitm.
378. P. siphonantha, W. W. Sm.
379. P. umbratilis, Balf. f. et Cooper.
380. P. Cawdoriana, Ward (fig. 40).
381. P. uniflora, Klatt.
382. P. Wattii, King.
383. P. Wollastoni, Balf. f.
384. P. metria, Balf. f. et Cooper.
385. P. chasmophila, Balf. f.
386. P. Reidii, Duthie (fig. 65).
387. P. eburnea, Balf. f. et Cooper.
    P. Harroviana, Balf. f. et Cooper.
388. P. Buryana, Balf. f.

Section XXVI.—ROTUNDIFOLIA, Balf. f.

(Fig. 66.)

The distribution of this small section is confined to the Himalaya and Tibet. Its members are easily recognized by the long petioles and the more or less orbicular leaves with cordate base. The capsules are of Nivalid type but are usually shorter and broader. The species are all high alpines. A very dense white farina appears on most of them. The nearest affinity is with the section Obtusifolia with which they have everything in common except the shape of the leaf. These two small sections might well be combined but it favours recognition to keep them under the two heads. Rotundifolia is clearly akin to the Nivalids, allowance being made for the very characteristic leaves. It shows relationship also through *P. Baileyana* with the section Souliei.

P. Clarkei and *P. pulchra*, sometimes placed in this section by reason of their leaves, will be found under one of the subsections of Petiolares. They may not be allowed to rest there but they do not belong to Rotundifolia.

P. Baileyana and *P. cardiophylla* are in cultivation. The section must be reckoned a somewhat difficult one. Its members in their native habitat have a covering of snow for some six months and resent changes during the winter months.

389. P. Baileyana, Ward.
390. P. Littledalei, Balf. f. et Watt.
391. P. cardiophylla, Balf. f. et W. W. Sm. (fig. 66).

392. P. rotundifolia, Wall.
393. P. Gambeliana, Watt.
394. P. cordata, Balf. f.
    P. cordifolia, Pax, non Rupr.
395. P. tzetsouensis, Petitm.

Section XXVII.—OBTUSIFOLIA, Balf. f.

(Fig. 29.)

This is a small section of Himalayan and Tibetan Primulas which has close association with the Farinosae on the one hand and Nivales on the other. In one way they form a link between the smaller Nivalids and the section Rotundifolia. They are all high alpines, in most cases covered with snow for six months. The leaves have an elongated weak petiole while the lamina is spathulate in shape and thin in texture. The crown is usually well encased in a covering of dead leaves from the previous season. The bracts are non-auriculate and the capsules short and broad, more or less equalling the calyx.

The section Rotundifolia is separated by its leaf-shape; Nivales by the characters of the leaf and the usually elongated capsule; the dwarf Nivalids of Western China are akin but yet separable. On the Farinosae side the section shows an approach to such non-auriculate species as *P. gemmifera* and *P. yunnanensis*, but the difference in habit and leaf-character is evident enough.

None of the species is in cultivation. They are almost certainly difficult to grow.

396. P. tenella, King (fig. 29).
397. P. Caveana, W. W. Sm.
    P. cana, Balf. f. et Cave.
398. P. Younghusbandiana, Balf. f.
399. P. Traillii, Watt.
400. P. Jaffreyana, King.
    Subspecies.
        401. P. lhasaensis, Balf. f. et W. W. Sm.
402. P. hazarica, Duthie.
403. P. obtusifolia, Royle.

Section XXVIII.—NIVALES, Pax.

(Figs. 41, 42, 43, 44, 45, 46.)

This is one of the largest sections of Primula and contains some of the finest in the genus. Its members are more amenable to cultivation than those of the Petiolares section but are much more difficult than those of either Candelabra or Sikkimensis. The stout fleshy resting bud takes badly to the fluctuating conditions of our winter with resultant rotting at the collar. Reasonable success has been attained with *P. chionantha*, *P. Ellisiae*, *P. Maximowiczii*, *P. Parryi*, and

P. Rusbyi. There is a chance of establishing *P. Agleniana*, *P. Inayatii*, *P. leucops*, *P. melanops*, *P. nivalis*, *P. pulchella*, *P. obliqua*, *P. russeola*, *P. sinopurpurea*, and *P. szechuanica*. Some have flowered in cultivation only to disappear—*P. brevicula*, *P. calliantha*, *P. limbata*, *P. minor*, *P. orbicularis*, *P. Prattii*, and *P. Purdomii*.

The section has no near kinship with Sikkimensis, Candelabra or Petiolares and is marked off quite clearly from these important sections. Along with the allied section Rotundifolia, its connexion is rather with Farinosae, although the members of this latter section are usually of much less robust habit.

The central species is the Siberian *P. nivalis* and associated with it are *P. Bayernii*, *P. eximia*, and *P. longipes*. In the Himalaya *P. nivalis* is replaced by *P. macrophylla* and its subspecies, all with purplish flowers. Associated with *P. macrophylla* and long confused with it are a series of yellow-flowered species: *P. Duthieana*, *P. elongata*, *P. obliqua*, *P. strumosa*, and *P. Stuartii*. In the three western provinces of China appears another large series of purple, rarely white, robust species: *P. chionantha*, *P. Farreriana*, *P. ingens*, *P. leucochnoa*, *P. limbata*, *P. optata*, *P. Purdomii*, *P. russeola*, *P. sinopurpurea*, etc. Another marked development of the section is seen in S.W. China with *P. calliantha* and its subspecies, these with *P. brevicula* and *P. helvenacea* lead on to *P. muliensis*, *P. falcifolia*, and *P. Agleniana*, the last one of the finest of all Primulas.

A striking subsection is also shown by *P. Maximowiczii* and its allies, *P. aemula*, *P. orbicularis*, *P. szechuanica*, and *P. tangutica*. In these the corolla segments tend to be strongly reflexed. In S.W. China there is further a series of dwarf species belonging to the section. They grow chiefly in rocky high alpine situations, often on limestone. Included there would be *P. amabilis*, *P. glacialis*, *P. leucops*, *P. minor*, *P. pulchella*, *P. pulchelloides*, and *P. rigida* with purplish flowers, and *P. crocifolia* and *P. Prattii* with yellow flowers. These have all elongate capsules, some very markedly so. Himalayan dwarfs of Nivalid affinity have a short capsule and constitute section Obtusifolia.

The few American species, *P. angustifolia*, *P. Cusickiana*, *P. Ellisiae*, *P. Parryi*, and *P. Rusbyi* have kinship with *P. nivalis*, but the three robuster species have a facies of their own and the merit of being moderately amenable to cultivation.

404. P. diantha, Bur. et Franch.
405. P. glacialis, Franch.
*406. P. brevicula, Balf. f. et Forrest.
407. P. leucops, W. W. Sm. et Forrest.
408. P. amabilis, Balf. f. et Forrest.
409. P. minor, Balf. f. et Ward.
    P. atuntzuensis, Balf. f. et Forrest.
    P. petraea, Balf. f. et Forrest.
410. P. rigida, Balf. f. et Forrest

---

* *P. brevicula* is almost certainly the same as *P. glacialis*, Franch.

411. P. helvenacea, Balf. f. et Ward.
412. P. Prattii, Hemsl.
    P. sulphurea, Pax.
413. P. crocifolia, Pax et K. Hoffm.
414. P. pulchella, Franch.
    Subspecies.
        415. P. compsantha, Balf. f. et Forrest.
416. P. pulchelloides, Ward.
    P. sulphurea, Pax et K. Hoffm. var. *rosea*.
417. P. calliantha, Franch.
    P. junior, Balf. f. et Forrest.
    P. proba, Balf. f. et Forrest.
    var. albiflos, (Balf. f. et Ward).
        P. albiflos, Balf. f. et Ward.
    var. nuda, Farrer.
    Subspecies.
        418. P. boreiocalliantha, Balf. f. et Forrest.
            P. propinqua, Balf. f. et Forrest.
        419. P. bryophila, Balf. f. et Farrer.
            P. shwelicalliantha, Balf. f. et Forrest.
            P. tribola, Balf. f. et Forrest.
        420. P. kiuchiangensis, Balf. f. et Forrest.
421. P. Agleniana, Balf. f. et Forrest (fig. 41).
422. P. falcifolia, Ward.
423. P. muliensis, Hand.-Mzt.
    P. Coryana, Balf. f. et Forrest.
424. P. sinonivalis, Balf. f. et Forrest.
425. P. limbata, Balf. f. et Forrest.
426. P. longipetiolata, Pax et K. Hoffm.
427. P. russeola, Balf. f. et Forrest.
    P. ionantha, Pax et K. Hoffm.
    P. nivalis, Pallas var. *melanantha*, Franch
    Subspecies.
        428. P. lancifolia, Pax et K. Hoffm.
429. P. ninguida, W. W. Sm.
430. P. leucochnoa, Hand.-Mzt.
431. P. sinoplantaginea, Balf. f.
    Subspecies.
        432. P. graminifolia, Pax et K. Hoffm.
433. P. sinopurpurea, Balf. f. (fig. 42).
434. P. melanops, W. W. Sm. et Ward.
435. P. chionantha, Balf. f. et Forrest (fig. 43).
436. P. ingens, W. W. Sm. et Forrest.
437. P. optata, Farrer.
438. P. Farreriana, Balf. f.
439. P. Purdomii, Craib.
440. P. Woodwardii, Balf. f.
441. P. Inayatii, Duthie.

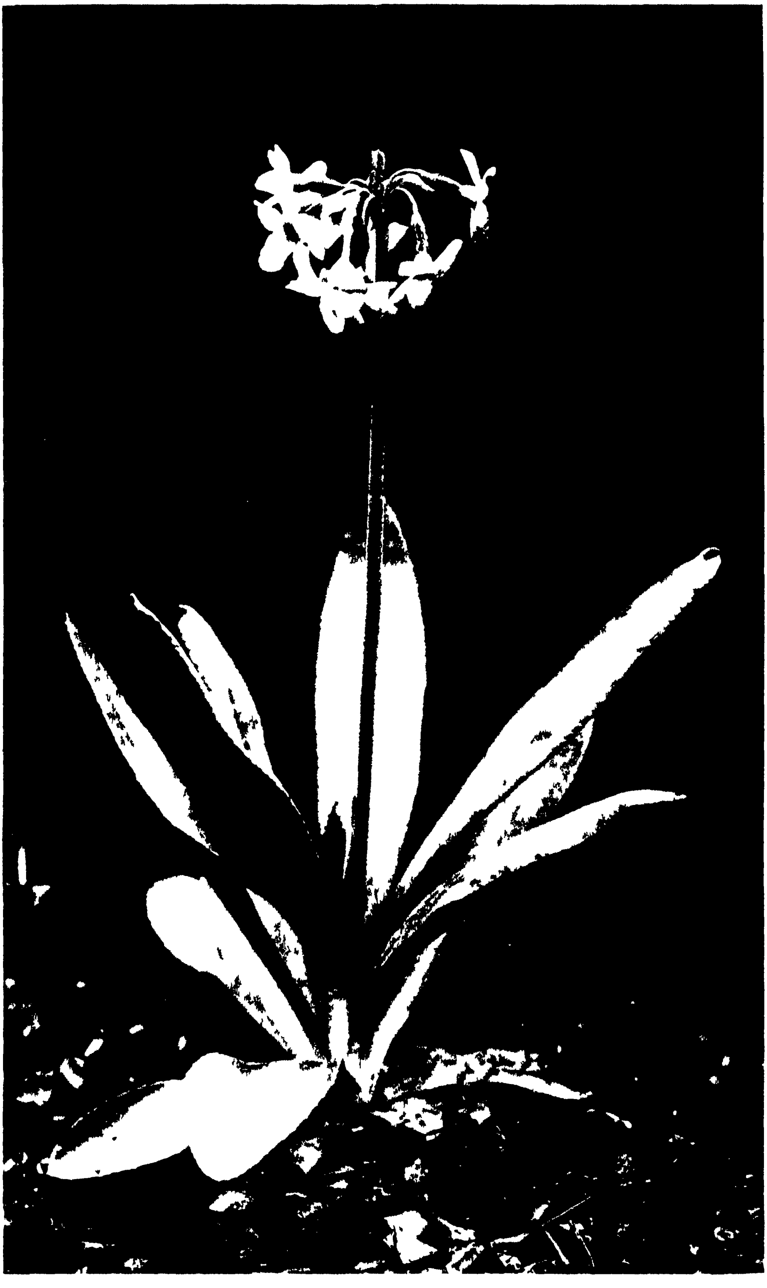


FIG. 13.—PRIMULA CHIONANTHA Balf. f. et Forr.
(p. 40)

[*To face p.* 40.

FIG. 44 PRIMULA RUSBYI Greene
(p. 41

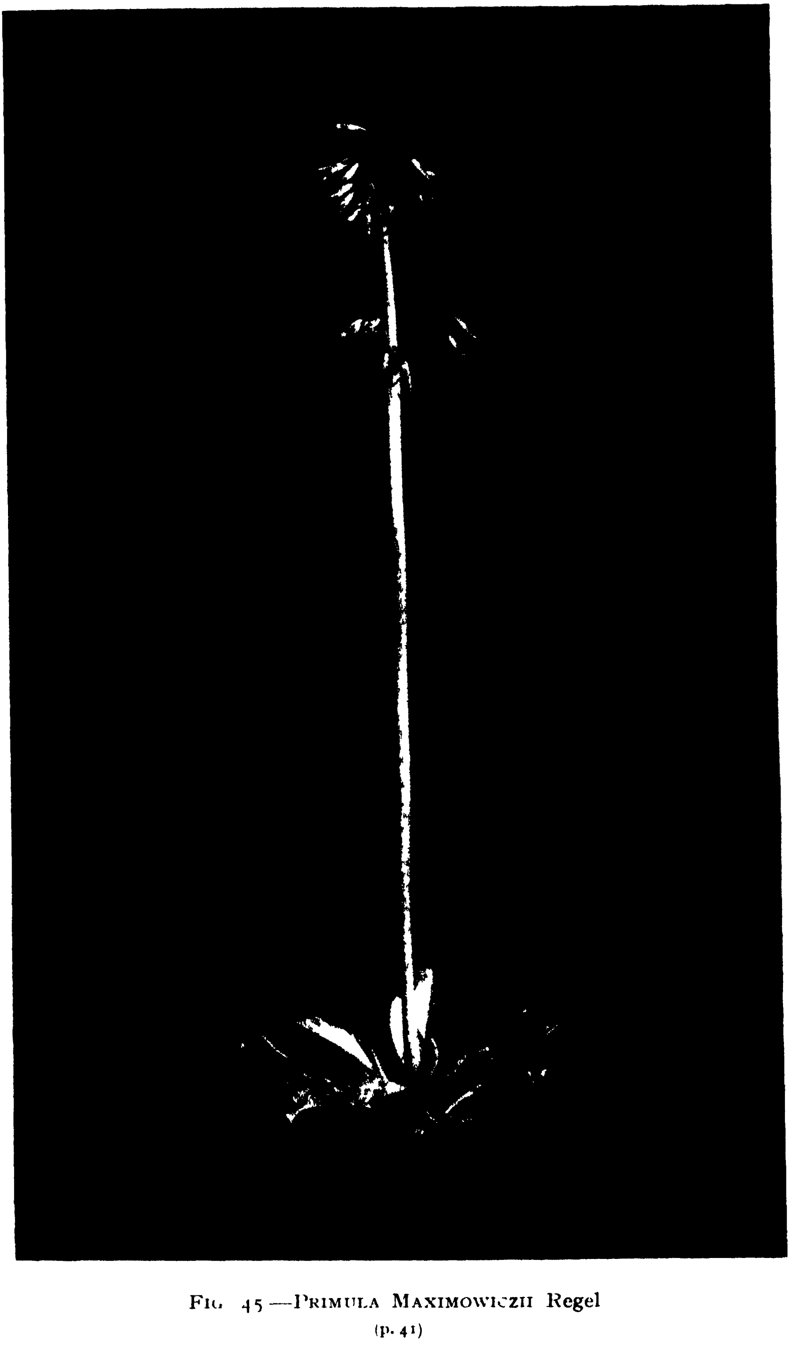


FIG. 45.—PRIMULA MAXIMOWICZII Regel

(p. 41)

FIG. 46.—PRIMULA SZECHUANICA Pax.
(p. 41)

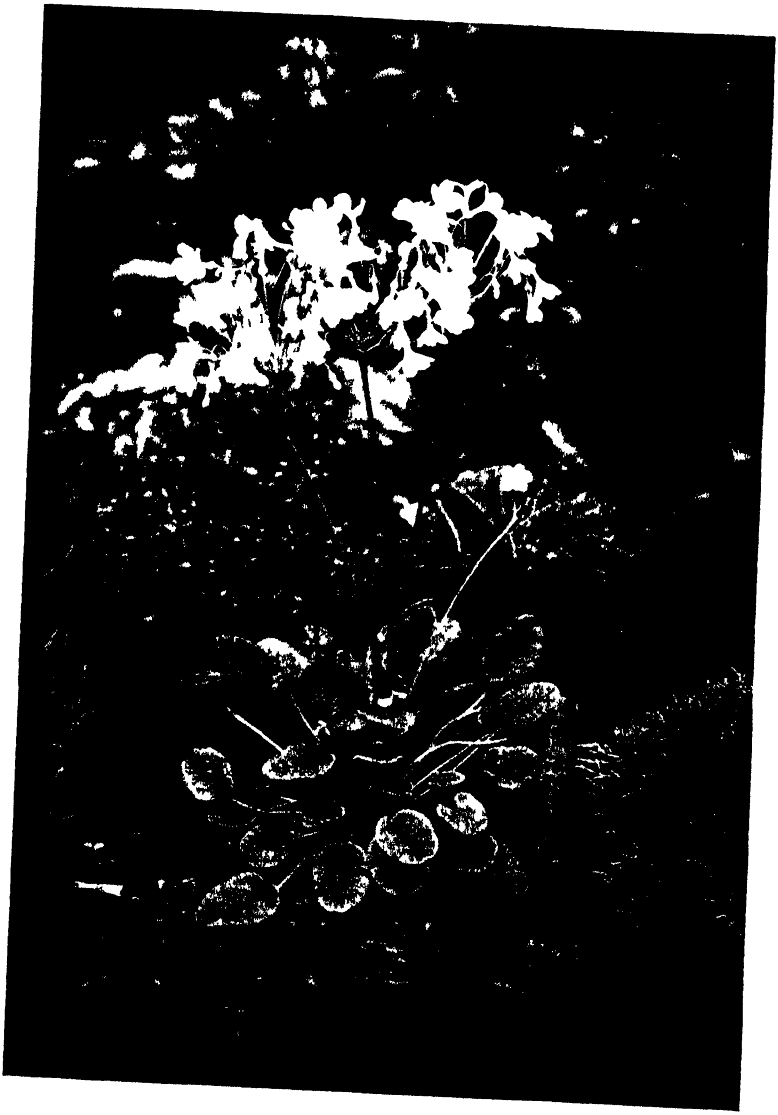


FIG. 17.—PRIMULA [illegible] Balf. f. et Forr.
(p. 4.)

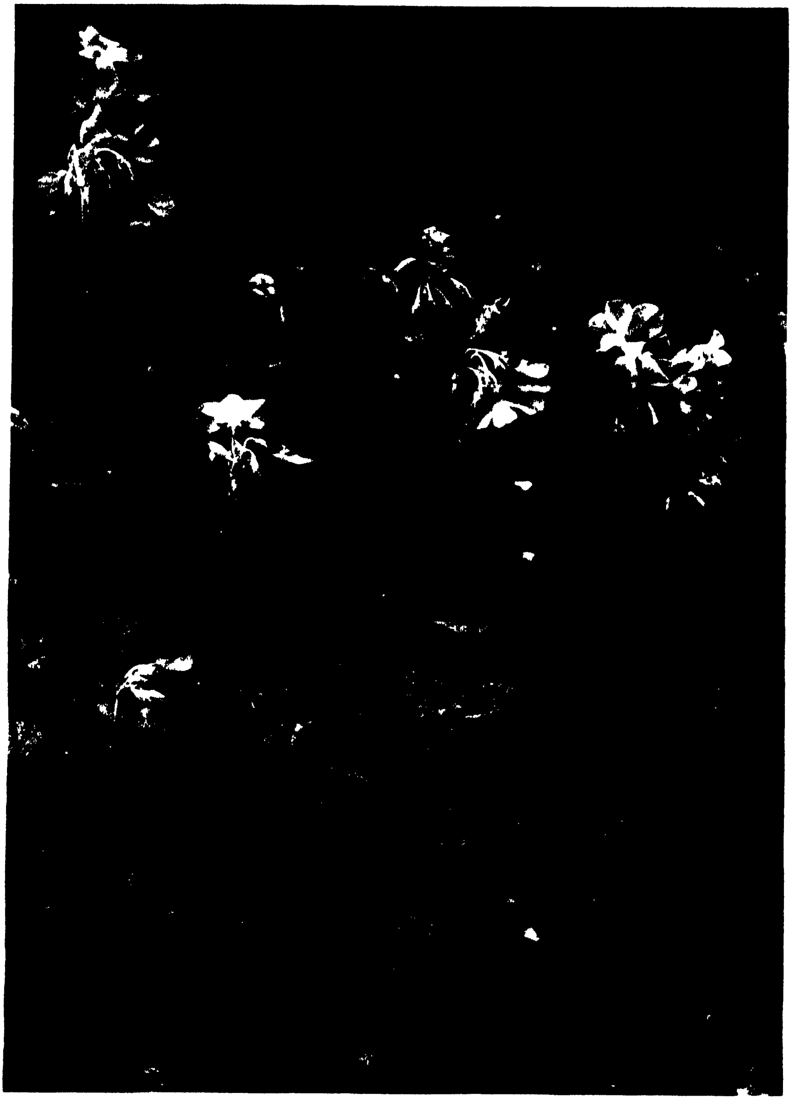


Fig. 48.—Primula microdonta violacea W. W. Sm.

(p. 42)

FIG. 49.—PRIMULA FLORINDAE Ward.

(p. 42)

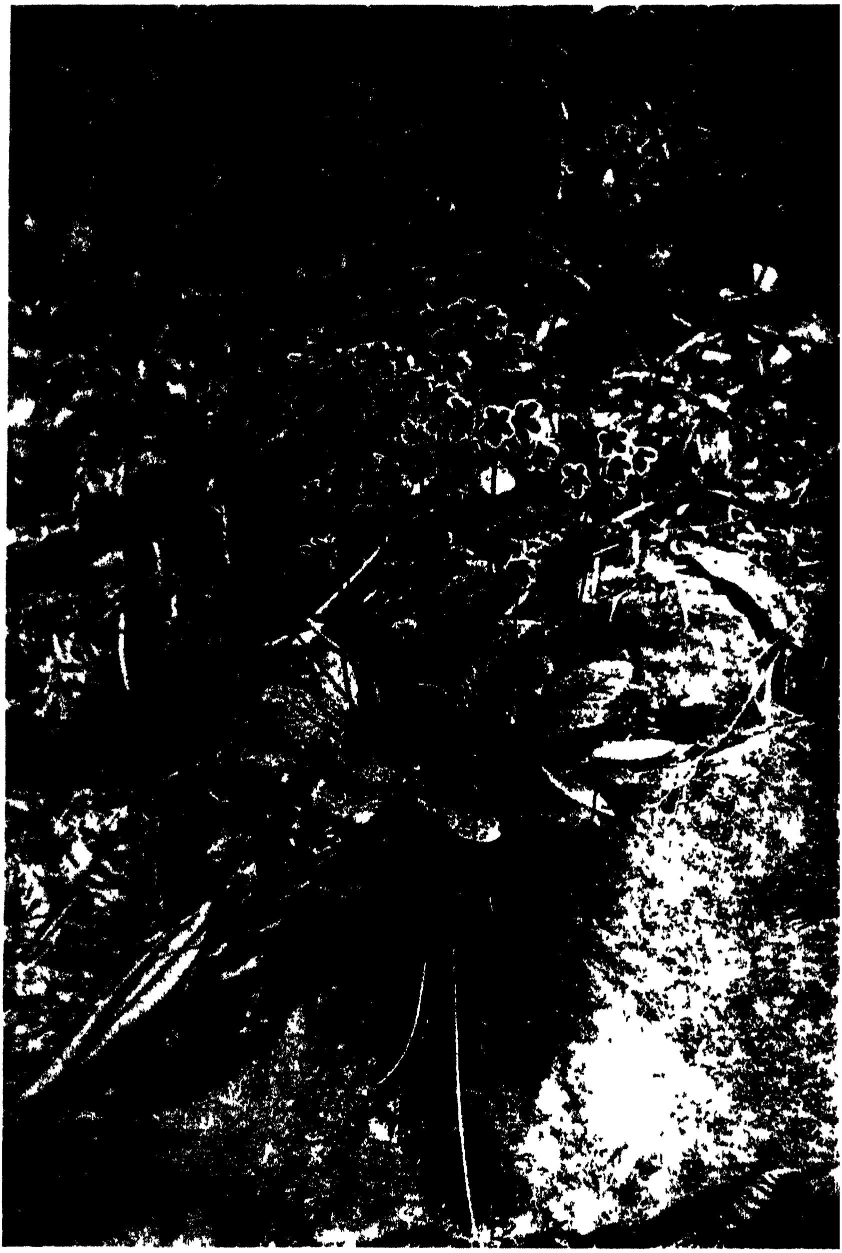


FIG. 50.—PRIMULA SERRATIFOLIA Franch.
(p. 43)

[*To face p.* 41

442. P. macrophylla, Don.
    P. purpurea, Royle.
    var. peariloba (Watt).
    var. macrocarpa (Watt).
    Subspecies.
        443. P. Aitchisonii, Pax.
            P. plantaginea, Watt mss.
        444. P. Moorcroftiana, Wall.
            P. Meeboldii, Pax.
445. P. eximia, Greene.
    P. Macounii, Greene.
446. P. pumila, Pax.
    P. arctica, Koidzumi.
447. P. longipes, Freyn et Sintenis.
448. P. Bayernii, Rupr.
449. P. nivalis, Pallas.
    var. farinosa, Schrenk.
    P. turkestanica, Regel.
450. P. Fedtschenkoi, Regel.
451. P. Parryi, A. Gray.
452. P. Rusbyi, Greene (fig. 44).
453. P. Ellisiae, Pollard et Cockerell.
454. P. Cusickiana, A. Gray.
455. P. angustifolia, Torr.
    P. Helenae, Auct.
456. P. elongata, Watt.
457. P. obliqua, W. W. Sm.
458. P. strumosa, Balf. f. et Cooper.
459. P. Duthieana, Balf. f. et W. W. Sm.
460. P. Stuartii, Wall.
461. P. orbicularis, Hemsl.
    P. ochracea, Pax et K. Hoffm.
    P. reflexa, Petitm.
462. P. aemula, Balf. f. et Forrest.
463. P. Handeliana, W. W. Sm. et Forrest.
464. P. Maximowiczii, Regel (fig. 45).
465. P. tangutica, Duthie.
    P. silenantha, Pax et K. Hoffm.
466. P. szechuanica, Pax (fig. 46).
    P. declinis, Balf. f. et Forrest.
    P. decurva, Balf. f. et Forrest.
    P. Gagnepainiana, Hand.-Mzt.

Section XXIX.—SIKKIMENSIS, Balf. f.

(Figs. 47, 48, 49.)

This is a section well known to the gardener. It is one of the easiest in cultivation and none of its members should deter even the tyro. The nearest affinities of the section appear to be the huge aggregate of the Nivalids and the section Candelabra. But it is quite distinct from both of these sections. Among other points, the shape of the corolla and the fruit and seed characters serve to distinguish it. The species quoted below are all undoubtedly of the Sikkimensis alliance. *P. tzetsouensis*, sometimes included here, is of Nivalid affinity and best placed under Rotundifolia. As many of the species are in cultivation it may be useful to add a few notes which may serve as means of recognition. Plants with yellow or whitish-yellow flowers and cuneate base to lamina are *P. sikkimensis*, its subspecies from limestone areas in Yunnan *P. pseudosikkimensis*, a whitish Bhutan subspecies *P. Hopeana* (lost probably in cultivation), and a dwarf alpine condition *P. pudibunda*. Yellow with cordate base to leaf are the robust *P. Florindae* with very glossy leaves and *P. microdonta* with matt leaves and a much wider corolla-bell; also the slenderer species—*P. firmipes*—with its subspecies *P. flexilipes*, both with rounded leaves, and *P. reticulata* and *P. chumbiensis* with more elliptic leaf-lamina. Purple to wine-coloured flowers and cuneate base to lamina are found in *P. Waltoni* and its subspecies *P. prionotes*; also in *P. secundiflora* and in *P. vittata*. Purple flowers associated with a cordate base to the lamina are seen in *P. microdonta* var. *violacea*.

467. P. sikkimensis, Hook.
    Subspecies.
        468. P. Hopeana, Balf. f. et Cooper.
        469. P. pseudosikkimensis, G. Forrest.
        470. P. pudibunda, W. W. Sm.
471. P. firmipes, Balf. f. et Forrest.
    Subspecies.
        472. P. flexilipes, Balf. f. et Forrest (fig. 47).
473. P. reticulata, Wall.
474. P. chumbiensis, W. W. Sm.
475. P. microdonta, Franch. ex Petitm.
    var. alpicola, W. W. Sm.
    var. violacea, W. W. Sm. (fig. 48).
476. P. Florindae, Ward (fig. 49).
477. P. Waltoni, Watt.
    Subspecies.
        478. P. prionotes, Balf. f. et Watt.
479. P. secundiflora, Franch.
480. P. vittata, Bur. et Franch.

Section XXX.—CANDELABRA, Balf. f.

(Figs. 50, 51, 52.)

This is a section now well known in gardens. The species are nearly all of easy cultivation and the majority of them are more or less established in gardens. Most produce a tall scape with numerous whorls of flowers—the candelabra inflorescence. But every Primula with this inflorescence does not belong to this section. Additional characters are found in the leaves resembling those of *P. acaulis*, in the calyx and in the fruit which is usually globose, though occasionally somewhat elongate. The section is to a certain extent an isolated one, but it invites comparison with Nivales and Sikkimensis. From the latter section, equally amenable in cultivation, the corolla-form is an easy distinction. The Nivales section, more or less intractable in culture, differs in habit, foliage, calyx and fruit.

The species of the section are separable by fairly good characters, but the following sets are of close relationship: *P. burmanica* with *P. Beesiana*; *P. chungensis* with *P. Cockburniana*; *P. Smithiana* with *P. helodoxa*; *P. mallophylla* with *P. japonica*; *P. brachystoma* and *P. microloma*, both dwarfs with the dwarf *P. prenantha*; *P. melanodonta* and *P. Morsheadiana* with *P. serratifolia*; *P. khasiana* with *P. prolifera*.

481. P. microloma, Hand.-Mzt.
482. P. brachystoma, W. W. Sm.
483. P. prenantha, Balf. f. et W. W. Sm.
484. P. Morsheadiana, Ward.
485. P. melanodonta, W. W. Sm.
486. P. serratifolia, Franch. (fig. 50).
    P. biserrata, Forrest.
487. P. Beesiana, G. Forrest.
    Subspecies.
        488. P. leucantha, Balf. f. et Forrest.
489. P. burmanica, Balf. f. et Ward (fig. 51).
490. P. aurantiaca, W. W. Sm. et Forrest.
491. P. Bulleyana, G. Forrest.
492. P. Cockburniana, Hemsl. (fig. 52).
    P. operculata, R. Knuth.
493. P. chungensis, Balf. f. et Ward.
494. P. pulverulenta, Duthie.
495. P. mallophylla, Balf. f.
496. P. japonica, A. Gray.
497. P. Miyabeana, Ito et Kawakami.
498. P. ianthina, Balf. f. et Cave.
499. P. imperialis, Jungh.
500. P. prolifera, Wall.
501. P. khasiana, Balf. f. et W. W. Sm.
502. P. helodoxa, Balf. f.
    Subspecies.
        503. P. chrysochlora, Balf. f. et Ward.
504. P. Smithiana, Craib.
505. P. Cooperi, Balf. f.
506. P. anisodora, Balf. f. et Forrest.
507. P. Poissonii, Franch.
    Subspecies.
        508. P. angustidens, (Franch.) Pax.
        509. P. Wilsoni, Dunn.
            P. glycyosma, Petitm.
            P. oblanceolata, Balf. f.

Section XXXI.—AURICULA, Duby.

(Figs. 53, 54.)

The list given below is based, with a few minor alterations, on the very complete analysis of the section given by Pax in his Monograph. No attempt has been made here to insert the many synonyms and the names of hybrids. These will find a place in an index to Primula which is in preparation.

Auricula is a well-known and readily recognizable section. With Verticillata it shares the characteristic involute folding of the young leaves and need not therefore be confused with any other section. The species cited are all in cultivation in this country. The section is European in its distribution, extending from the Pyrenees to the Alps and then onwards to the Apennines, the Carpathians and the Balkan Peninsula.

PAX divides the section into seven subsections which are cited below, with the species contained in each.

Subsection Euauricula.

510. P. Auricula, Linn.
    var. ciliata, (Moretti) Koch.
    var. Obristii, (Stein) Beck.
    var. serratifolia, Rochel.
    var. Widmerae, Pax.
511. P. Palinuri, Petagna (fig. 53).

Subsection Brevibracteatae.

512. P. carniolica, Jacq.
513. P. viscosa, All. (fig 54).
514. P. marginata, Curtis.

Subsection Erythrodrosum.

515. P. pedemontana, Thomas.
516. P. apennina, Widmer.
517. P. villosa, Jacq.
    Subspecies.
        518. P. commutata, Schott.
            f. cottia, (Widmer) Lüdi
            P. cottia, Widmer.
519. P. oenensis, Thomas.
520. P. hirsuta, All.
    var. angustata, Widmer.
    var. exscapa, Pax.
    var. nivea, Sims.

Subsection Arthritica.

521. P. glaucescens, Moretti.
    Subspecies.
        522. P. longobarda, Porta.

523. P. spectabilis, Tratt.
524. P. Wulfeniana, Schott.
    Subspecies.
        525. P. Baumgarteniana, Degen et Moesz.
526. P. Clusiana, Tausch.

Subsection Rhopsidium.

527. P. integrifolia, Linn.
528. P. tyrolensis, Schott.
529. P. Kitaibeliana, Schott.
530. P. Allionii, Loisel.

Subsection Cyanopsis.

531. P. glutinosa, Wulf.
532. P. deorum, Velen.

Subsection Chamaecallis.

533. P. minima, Linn.

Section XXXII.—VERTICILLATA, Balf. f.

(Fig. 55.)

The species of this section and of Auricula are distinguished from all other species by the involute folding of the young leaf. From the allied section Auricula, it is easily separated by the membranous leaves, superposed verticels of flowers and the leafy bracts. It is a small section of limited distribution—West Himalaya, Arabia, Sinai, and Abyssinia. All have been or are in cultivation in Europe as greenhouse plants with the exception of *P. Aucheri*. More familiar is possibly the hybrid *P.* × *kewensis*, a cross between *P. verticillata* and *P. floribunda*.

PAX included in this section with some doubt *P. Lacei*, Hemsl. et Watt from Baluchistan. BALFOUR in JOURNAL R.H.S., **39** (1913), p. 170, considered it should be placed in his section Suffruticosa (Bullatae). See also BALFOUR in *Trans. Bot. Soc. Edin.*, xxvi, p. 202. The characters of *P. Lacei* as regards habit and structure of flower lead rather to the genus Dionysia. It comes from near the Persian border and thus would link up geographically. PAX in *Jahr.-Ber. Schles. Gesell.*, lxxxvii (1909), *Zool.-Bot.*, II. Abt., p. 20, describes a new section of Primula under the name of Dionysiopsis. In this he includes *P. Bornmuelleri*, Pax (*Dionysia Bornmuelleri*, Strauss mss.), and *P. hissarica* (Lipsky), Bornm. This section he defines as being intermediate between Primula and Dionysia. *P. Lacei* undoubtedly belongs to this alliance. There seems to be almost a general agreement to uphold the genus Dionysia although there is little to mark it off from Primula. The flowers are remarkably like those of the section Verticillata; there are, however, marked differences in habit and in the vernation and texture of the leaves. These Dionysias are the Persian Primulas presenting a parallel development to Verticillata.

But if Dionysia is to be retained as a genus, then the members of section Dionysiopsis along with *P. Lacei* are preferably kept under Dionysia. PAX is clearly right in seeing this connexion of Primula through Verticillata with Dionysia and the question is simply where the line is to be drawn.

534. P. floribunda, Wall. (fig. 55).
535. P. Aucheri, Jaub. et Spach.
536. P. verticillata, Forsk.
    Subspecies.
        537. P. Boveana, Dcne.
        538. P. simensis, Hochst.

ADDENDUM.

As the genus Omphalogramma has been included in Primula by various authors, it may be of service to give here as an addendum the species of that genus.

OMPHALOGRAMMA.

Omphalogramma is distinct from Primula. The earlier species were described under Primula, then assembled under the new generic name by FRANCHET and brought back again to Primula by PAX. More ample material is now available and there seems little doubt but that FRANCHET was right. The single-flowered ebracteate scape, the non-heteromorphic and somewhat irregular flowers, the six-partite corolla and the peculiar seeds serve to distinguish the genus readily from Primula. Of the species *O. vinciflorum* is the finest and the one which so far has succeeded best in cultivation. *O. Delavayi*, *O. Elwesianum*, *O. Farreri*, *O. Rockii* and *O. Souliei* have flowered in this country. *O. Delavayi* and *O. Farreri* are closely allied; *O. Forrestii* is probably a subspecies of *O. Souliei*; *O. Rockii* comes near *O. vinciflorum*.

O. Coxii, Balf. f.
O. Delavayi, Franch.
O. elegans, Forrest.
O. Elwesianum, Franch.
O. Engleri, (Knuth) Balf. f.
    O. Viola-grandis, Farr. et Purd.
O. Farreri, Balf. f.
O. Forrestii, Balf. f.
O. minus, Hand.-Mzt.
O. Rockii, W. W. Sm.
O. Souliei, Franch.
O. vinciflorum, Franch. (fig. 56).

EXPLANATION OF DIAGRAMS.

DIAGRAM I.

This diagram is designed to give merely the geographical extension of the sections of the genus from West to East. It is not intended to represent the relative size of the sections. The sections are arranged in three groups corresponding to the three named groups in diagram II.

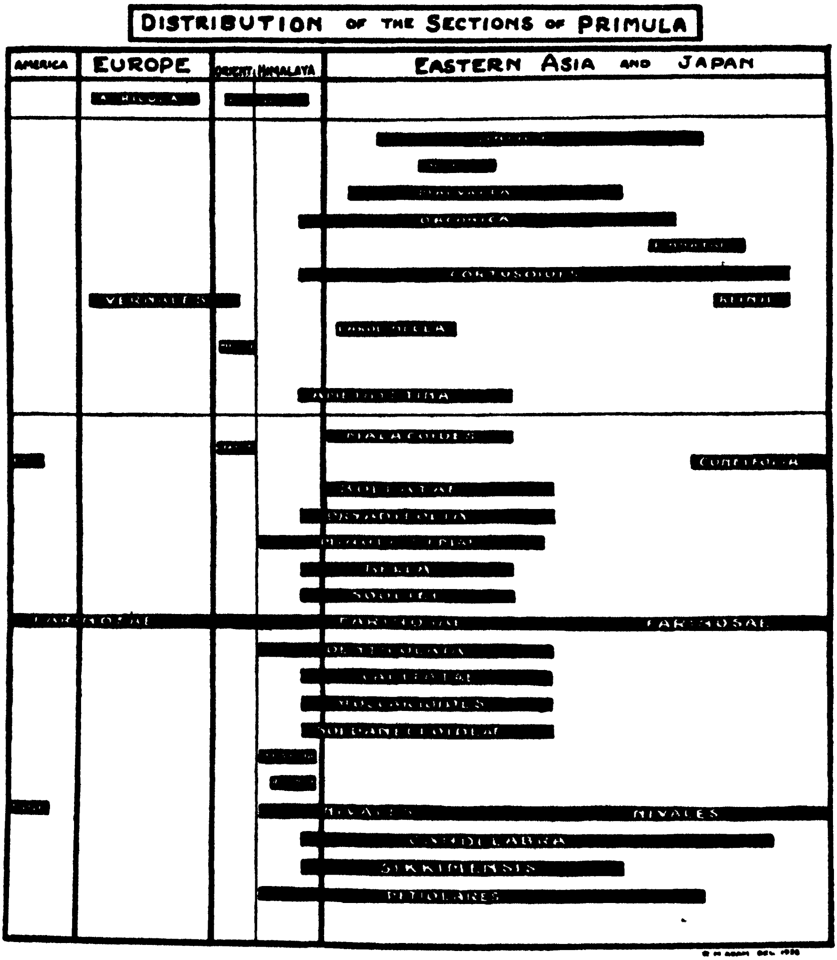
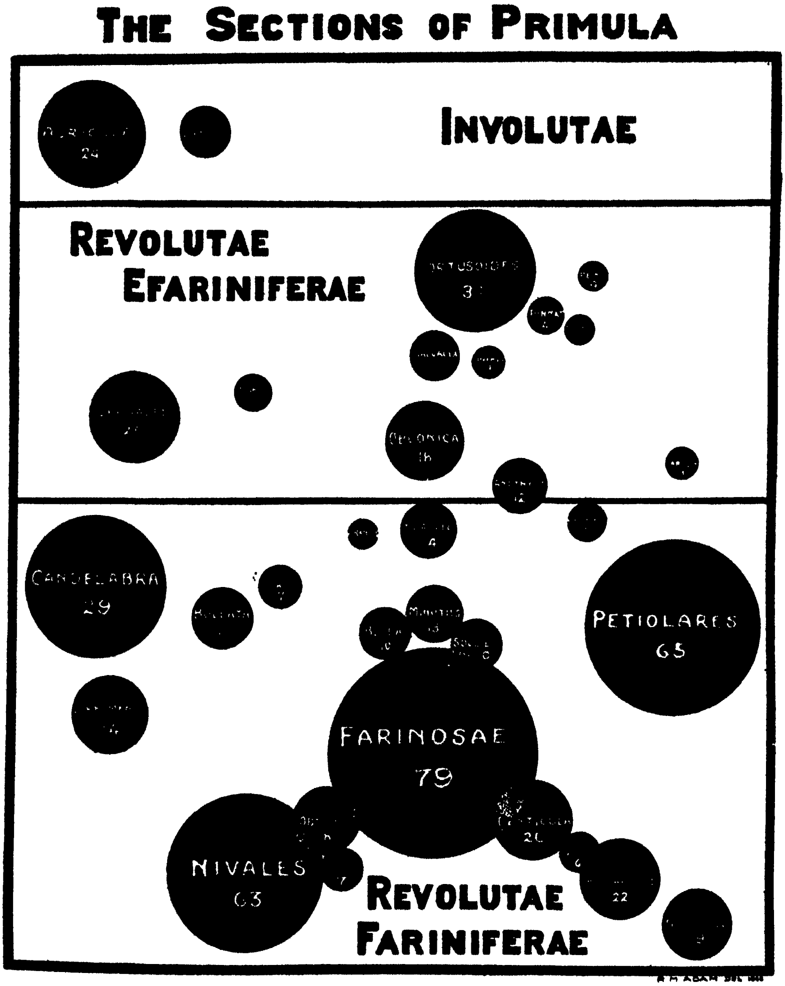


DIAGRAM II.

This diagram is an attempt to represent the relative sizes and the affinities of the various sections. The sections are not drawn strictly to scale, as the smaller ones have been considerably enlarged for the sake of clearness. But the numbers inserted within the circles indicate the number of species and subspecies contained in each.

The sections are arranged in three groups. This is not quite in harmony with the arrangement in the principal key, p. 6. In the key the Primulas with campanulate corollas are separate from both the fariniferous and efariniferous groups—solely for ready means of identification. In the diagram they are distributed from the point of view of their presumed affinities. For example it is clear that Soldanelloidae is akin to Muscarioides in spite of the difference in shape of corolla.


THE SECTIONS OF PRIMULA

The relationships of the groups are discussed in the text and a detailed explanation of the diagram is hardly necessary. The following points, however, may be noted:

(1) The affinity of Obconica with Malacoides as indicated by their approximate juxtaposition.

FIG. 51.—PRIMULA BURMANICA Balf. f. et Ward.
(p. 43.)

[*To face p.* 48

Fig. 52.—Primula Cockburniana Hemsl.

(p. 13)

FIG. 55. PRIMULA PALINURI Petagna

[illegible]

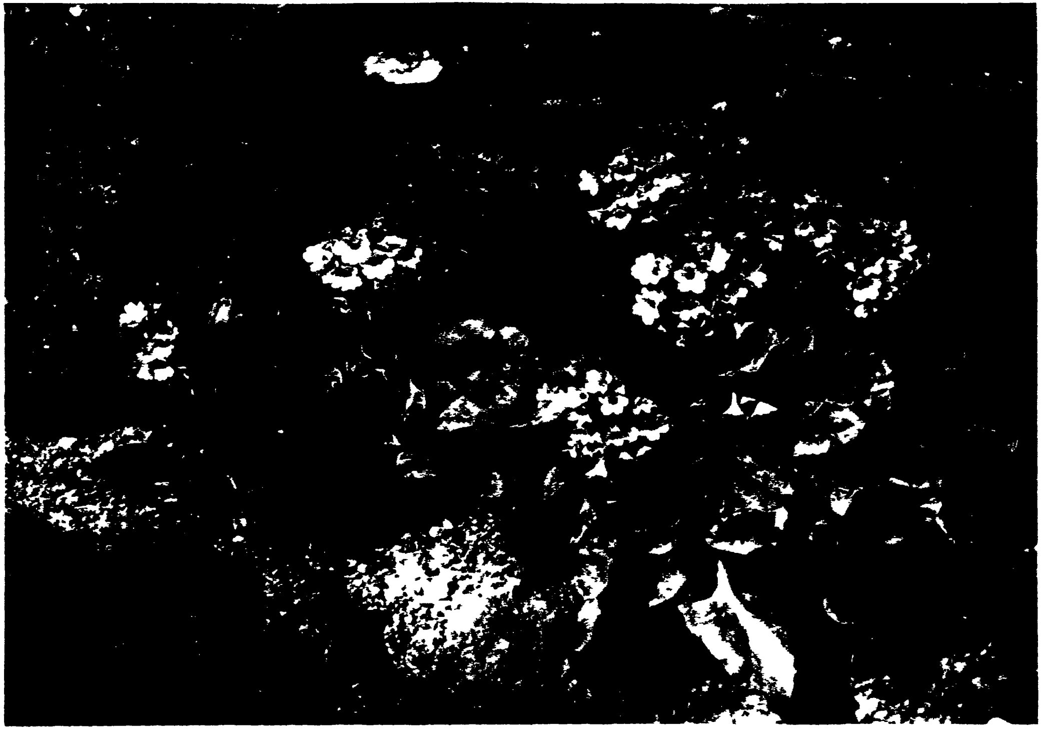


FIG. 54.—PRIMULA VISCOSA CYNOGLOSSIFOLIA

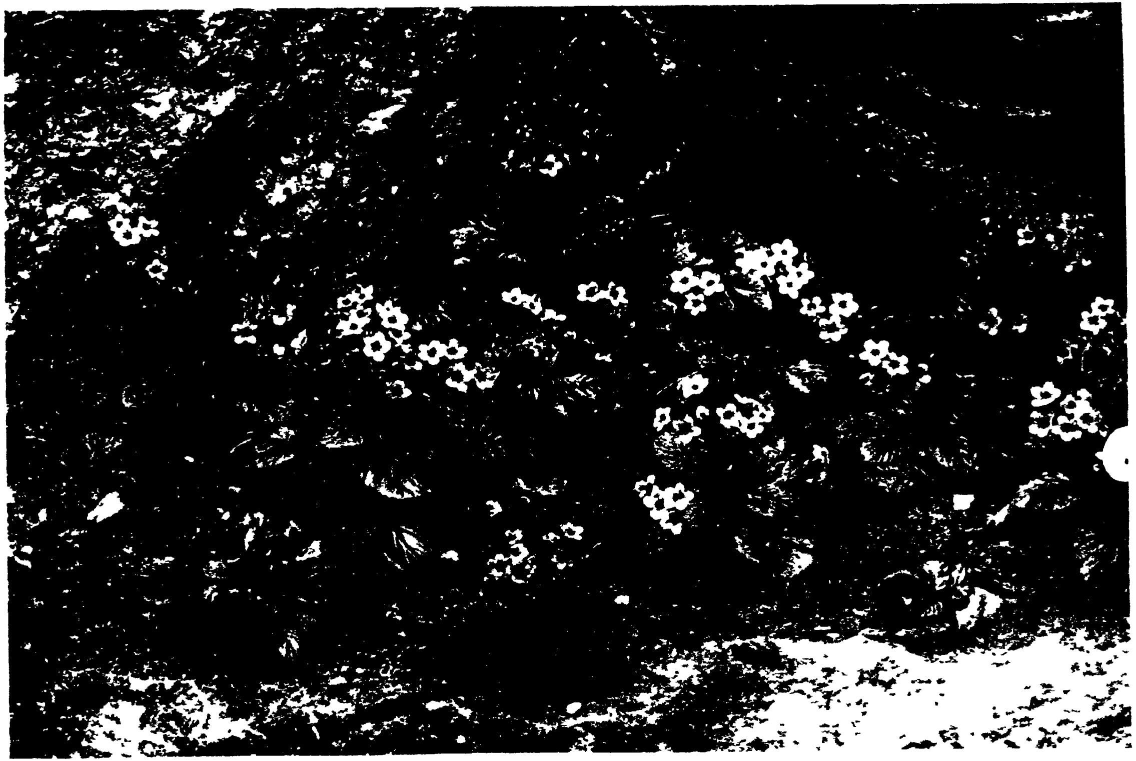


FIG. 55.—PRIMULA FLORIBUNDA Wall.
(p. 46.)

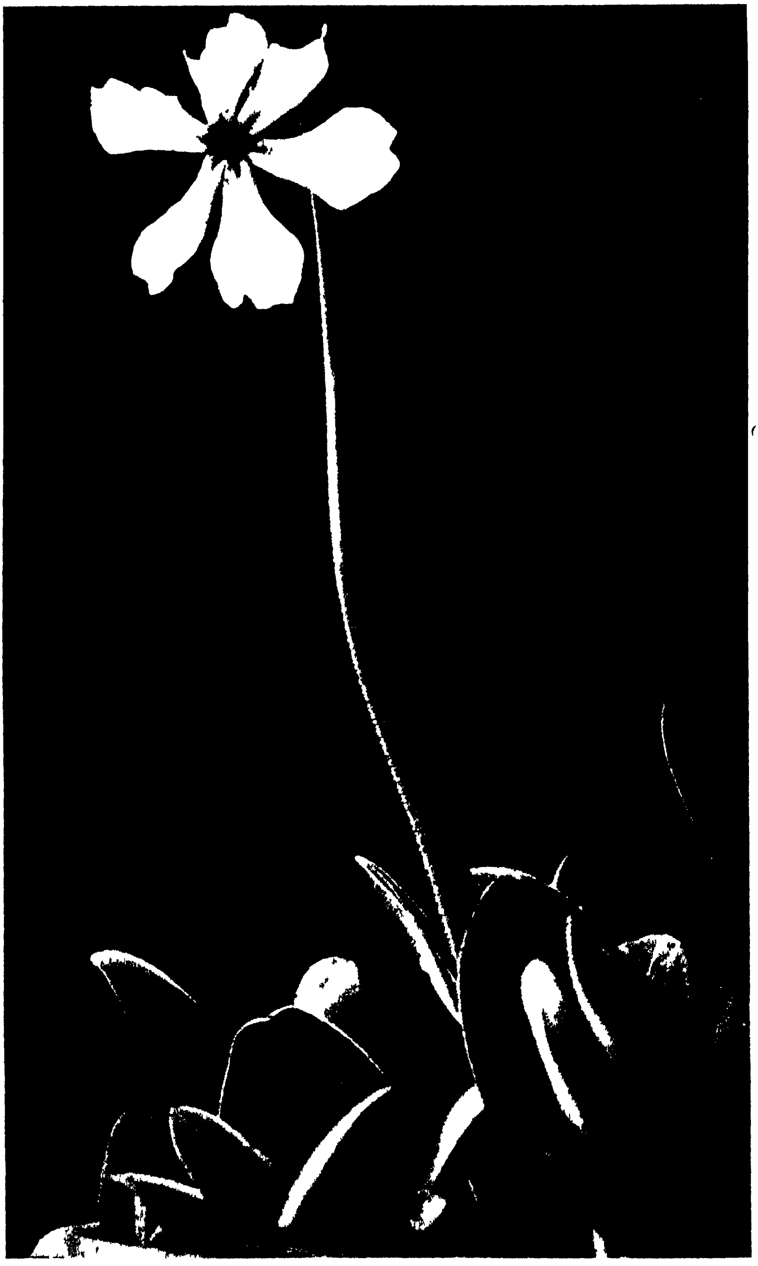


FIG. 56. OMPHALOGRAMMA VINCIFLORUM Franch.
(p. 40)

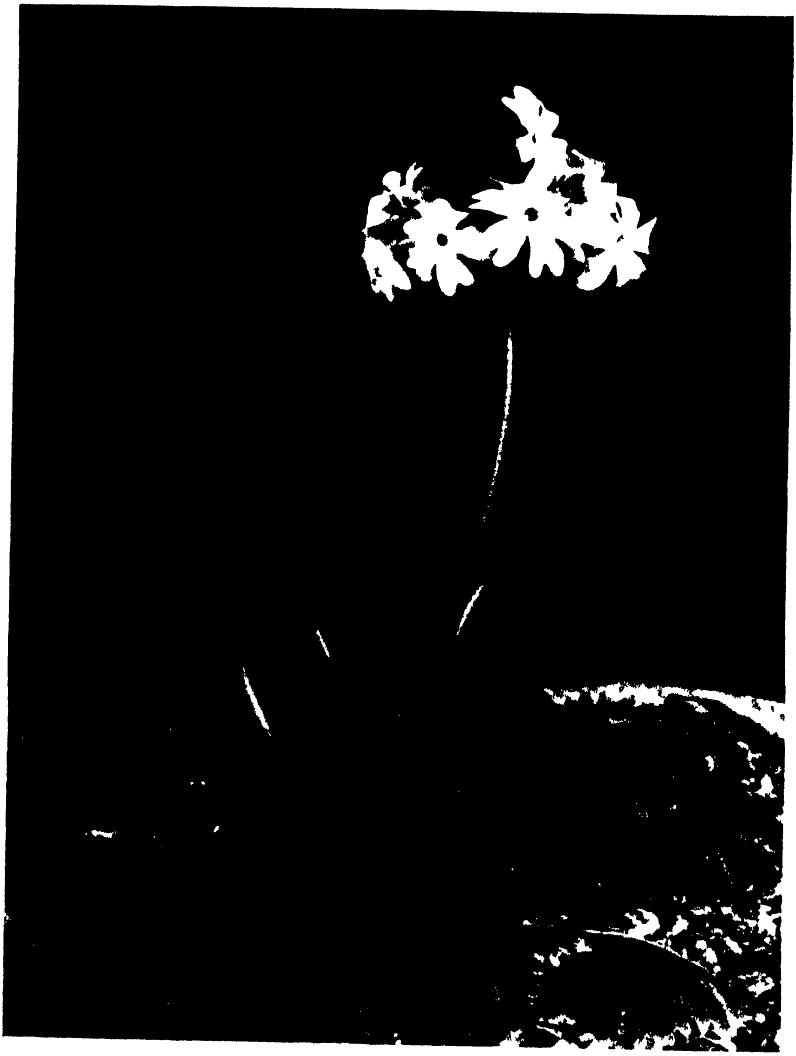


FIG. 5. PRIMULA LATISECTA W. W. Sm.
(p. 17)

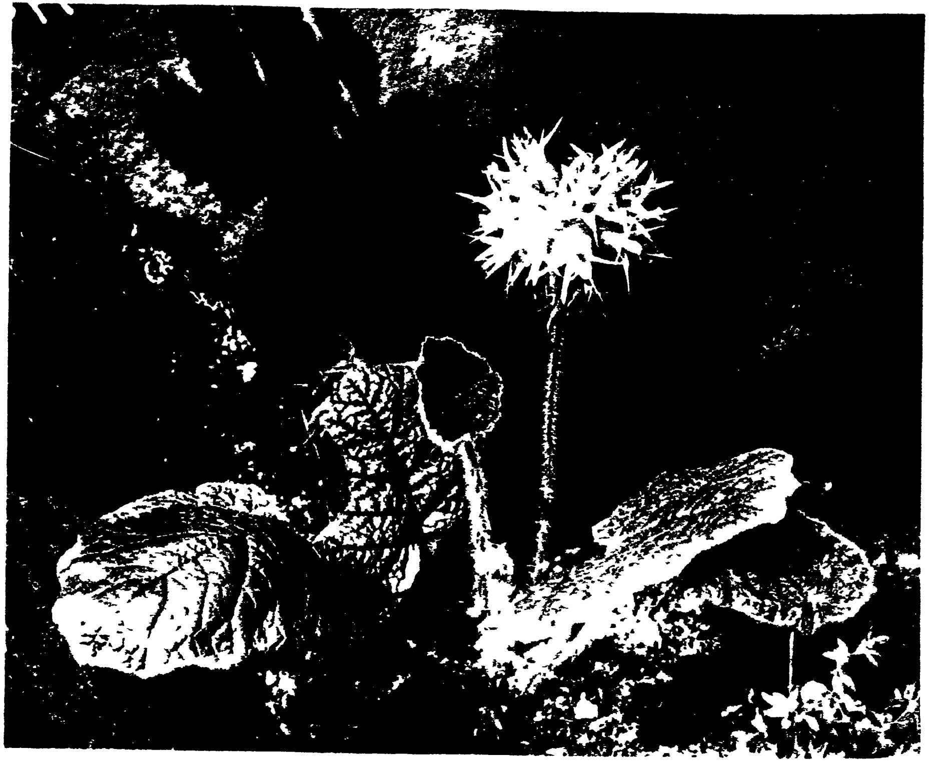


FIG. 58 – PRIMULA PYCNOLOBA.

p. 78

(2) The slight tendency of Amethystina to the development of farina.

(3) The relatively feeble development of farina in Cuneifolia.

(4) The prominence of the Farinosae centre with its attendant sections. The near approach of certain of these sections to Farinosae is indicated by the touching or by the intersection of the circles. In the case of the intersections it is probable that no very definite line can be drawn between the sections concerned.

* * * * * *

After a summary of the foregoing paper had been given by Mr. CHITTENDEN the following remarks were made:

The CHAIRMAN: I am sure we are all very grateful to Professor WRIGHT SMITH for having laid before us such a comprehensive picture of this genus, and we are very much obliged to Mr. CHITTENDEN for having shown so clearly what Professor WRIGHT SMITH'S system means. There are some of us here who know something about Rhododendrons, something about Gentians, something about Louseworts, and those of us who have had to work at these things can realize immediately how very similar the story of the Primula is to these other genera that are so extraordinarily varied in the forms in which they are manifested in China.

We have here to-day with us Dr. HANDEL-MAZZETTI, and in welcoming him to this Conference, and knowing that he has been in China, where so many of the species come from, perhaps he will favour us with a few remarks on this paper which has been analysed for us by Mr. CHITTENDEN.

Dr. HANDEL-MAZZETTI: I have long been in correspondence with Professor WRIGHT SMITH, and he did me the honour to send me his last book, before it was published, for criticism. Of course, I could hardly make any criticism, because Professor WRIGHT SMITH knows more about the genus Primula than almost any other man.

The genus has been known for a very long time, and has appeared very much in literature. Professor WRIGHT SMITH, the successor of Sir ISAAC BALFOUR, is the most able man to deal with this interesting and beautiful genus; I think this paper must almost be the final word on the genus Primula. As I said, we can hardly offer any criticism, but accept his statements with the greatest satisfaction.

The CHAIRMAN: Has any other member of the Conference any remark to make?

Mr. L. SUTTON: I am afraid I cannot enter into the details of the paper, but I should like to say I consider it a most valuable acquisition, and I am sure we shall all be glad to have an opportunity of studying it carefully. We are greatly indebted to Professor WRIGHT SMITH for having prepared the paper, and to Mr. CHITTENDEN for having summarized it for us.

Mr. R. J. GUMMER: May I just say how pleased everybody must be to have this new classification of Primulas; it was a terrible welter as it was left by PAX, and even as it was left at the last Primula Conference. This is a very great advance to get down to something like a practical knowledge of the whole subject.

I should like to make one remark. I think it has been said that *Primula obconica* has proved invariable; I understood that it was always believed that *P. sinensis* in cultivation was very variable, but just the reverse in Nature. In Nature *P. obconica* was very variable, but it was not so in cultivation. I should very much like to know whether that is undergoing any alteration in the course of time.

Mr. CHITTENDEN: I think the illustration that you will see of *P. obconica* in the tent next to this will convince everyone of the extreme variability that that plant has shown during recent years. I think I am right—Mr. SUTTON will correct me if I am wrong—in saying that for the first few years of its cultivation *P. obconica* varied little, but suddenly something seemed to happen to it: we had a tremendous number of breaks in colour, in increased size, and the like; some of the differences were so great that there came to be a legend that *P. obconica* had been crossed with *P. sinensis*. You will find that in the literature; but you will also find in the literature a refutation of that idea, showing that it is the species itself that has suddenly taken it into its head, so to speak, to vary.

Mr. SUTTON: I believe Mr. CHITTENDEN is quite right in saying the development of *P. obconica* is a variation by selection; it has not got the blood of *P. sinensis* in it. I think we are shortly going to see great variations in *P. malacoides*. I wish we could have seen it flowering here; and again these variations have come not from crossing, but from selection.

Professor ARMSTRONG: I should like to call attention to the extraordinary interest which attaches to the Primula group from the colour point of view. Everyone is familiar with the white meal which appears on the leaves in a great number of Primula forms. That substance is the parent substance from which nearly all the plant colouring matters are derived. It is itself colourless, but it needs very little change to be made in its structure to give rise to yellows and then to blues and reds. We have not, so far as I know, the least idea at present as to what the function of that meal is on the leaves and other parts of the plant, and it is a fact, I believe, that there are very few genera which have that meal. It is almost peculiar to the Primulas. Ultimately, I take it, the Primula group will be one of profound significance in tracing out the colour story.

The CHAIRMAN: That gives us a new interest in the old "Dusty Miller."

THE NATURAL HABITATS OF CHINESE PRIMULAS.

By Dr. H. HANDEL-MAZZETTI, Natural History Museum, Vienna.

IT was not without some hesitation that I accepted the honouring invitation to speak at a meeting of the Royal Horticultural Society, for, as a systematic botanist I know about as much of gardening as a zoologist as such knows of horsemanship. However, although I have not occupied myself with all the subtleties of the modern science of the soil and ecology, I have always endeavoured to study the phytogeographic structure of the countries I have explored, and have carefully noted the habitats of the plants collected.

As I collected in China eighty-three species of the genus Primula, I hope to be able to give some account which may be of interest to the growers of Primulas. Every gardener attempts to offer each plant as far as possible the same conditions as those under which it flourishes in nature. As he cannot alter the climate in which he works, he must substitute for climatic peculiarities different types of soil and situation which do not entirely but only partly coincide with their natural edaphic—that is soil—conditions. We observe in nature that many plants do the same. I am reminded of *Rhododendron Simsii* Planch., perhaps still better known to you as *Azalea indica*, which in the wet climate of Central China, in Hunan for instance, where I worked for eighteen months, is common everywhere almost without regard to station, whereas in the much drier climate of the Yunnan plateau it is confined to very restricted damp localities in ravines.

Let us first consider the climatic conditions of the Chinese Primulas. The diagrams in Professor SMITH's paper show us that the centre of the genus is in China as regards number of sections as well as species. If the actual area over which the Primulas occur is mapped it will be found that but a comparatively small part of China is involved, for if we subdivide still further, drawing a boundary line about 104° of East longitude, almost the whole of the Primulas lies to the west of this line, and the east part of China remains relatively empty. There are both climatic and geomorphic reasons for this. Most of the Primulas are mountain plants; in the east, however, we find low and hot country to which only a few species are adapted. But this is not the only way to divide China from a climatic and phytogeographic point of view.

In China proper seven districts each essentially different from the other can be distinguished. There is *tropical China*, reaching about to the tropic of Cancer; no Primulas grow there at all. The genus is represented in the tropics only on a few high mountains, but tropical China has no mountains high enough.

The biggest part of China consists of the *Central Chinese Floral Province* which includes Middle Japan and reaches in the west to the slope of the Yunnan plateau and of the high mountains of West Szechwan, and in the north to the Tsinling-shan. It is a low country, its mountain ranges attaining the natural forest limit only at its boundaries in the west and north. Plentifully supplied with water and accessible to the south-east monsoon, it is a damp country, of subtropical character in the lowest parts which cover an extensive area. It has a rather pronounced dry period in late summer lasting to autumn, but at other times copious precipitations occur of about sixty-five inches yearly, only rarely as snow, at a minimum temperature of 21° F. The average maximum temperature in summer is about 100° F., and often for weeks it does not fall much below it even at night. I never observed less than 30 per cent. atmospheric humidity. Such a climate is a pronounced laurel climate, and the laurel type is predominant in vegetation. Much as I have travelled through Central China (i.e. in the provinces of Kweichow and Hunan), I saw not one Primula. There are three Balfourian indications of Primulas from Yo-chow in Hunan. But these erroneously arose from the French transcription of the Yo-shan near Tung ch'uan in North-East Yunnan. There are, however, some Primulas in Central China; above all the well-known *Primula sinensis* Lindl. and *P. obconica* Hance. Their occurrence has been sufficiently dealt with in literature: *P. sinensis*, in the wild form now distinguished as *P. calciphila* Hutch., grows in the crevices of limestone rocks in the big Yangtze gorge; as to *P. obconica*, there was first a mistaken account spread (this JOURNAL, vol. 39, p. 141), which was corrected later to the effect that it grows under shrubs on sandstone. It is easily understood that both these typically subtropical plants were the only ones fitted to be cultivated by the Chinese on the coast, and thus were the first Chinese Primulas to come to Europe. Recently some additional and, as it seems, very rare species have been discovered, the habitats of which are said to be decomposed rocks (of what kind?) in shady bush-covered depressions (*P. Filchnerae* Knuth) and limestone rocks (*P. cicutariifolia* Pax), whilst *P. erodioides* Schltr. and *P. Merrilliana* Schltr. seem to be chasmophytes. In the higher situations of the Middle Chinese floral province some other Primulas have been found, as *P. aequipila* Crb., *P. hupehensis* Crb., *P. fagosa* Balf. f. et Crb., *P. mallophylla* Balf. f., *P. Fargesii* Franch., *P. Watsoni* Dunn, the habitats of which are not described, but in any case are similar to those in the western mountains.

To the north-east adjoins the *Northern Chinese and Corean Floral Province* where deciduous large leaved trees predominate over the conifers. Its climate is characterized especially by much severer winters and less humidity. The province is the home of a few Primulas of North-Japanese and Siberian affinity. *P. Paxiana* Gilg. is said to grow in damp places along slopes and larger boulders. *P. saxatilis* Kom. is easy to cultivate, and probably does not make very particular demands as regards habitat in nature, though there are no records of this. It is said to differ from the very nearly allied *P. patens* Turcz., in addition to morphological characters, by its habitat in rocky places.

In the west, somewhat on this side of the eastern frontier of Shansi, the *Loess Steppe Province* joins on, which includes the Kuku-nor and the upper course of the Hwang Ho. The loess steppe is by no means a place for Primulas. The loess, however, does not cover the highest ranges of this country, and on these some Primulas grow, particularly *P. Maximowiczii* Reg., in the west *P. stenocalyx* Max. and others, but none seems to be endemic in the mountains of the loess country; all must be considered enclaves from the south-western vicinity. It is probably the same with *P. Licentii* W.W.Sm., described a short time ago as belonging to the Malacoides section, but now recognized as in the Farinosae.

In the *East Tibetan Grassland* the conditions are probably similar. As far as can be judged from literature and from what I could observe in its southernmost corner at Chungtien in Yunnan, its natural meadows are not good localities for Primulas. At best *P. Maximowiczii* and *P. tangutica* can be considered grassland plants, and also perhaps *P. orbicularis* Hmsl., which, however, has also been found under *Sorbus* and *Rhododendron* and in mossy spruce forest. The rather numerous species encountered in this country require particular habitats, and most of them are at home only on the highest mountain ridges overtopping the grassland. We can gather from LIMPRICHT'S work that *P. gemmifera* Bat. inhabits screes and rocks (from H. SMITH, also alpine meadows), *P. stenocalyx* Max. limestone rocks, *P. crocifolia* Pax et Hffm. screes, and *P. Souliei* Franch., stony meadows in the highest regions.

There remains the *Province of the highland and the high mountains of Yunnan and West Szechwan*, the real home of the genus *Primula*, where more than the third part of all the species is indigenous. The climate of this phytogeographic province which extends from the Tropic of Cancer to beyond Sungpan over at least 8° of latitude, but is narrowed here more and more between the wet central China and the Tibetan grassland, is at least in the lower parts relatively dry. There is a very pronounced dry period in winter and spring; then the rain time indeed is very rich in precipitations, but these are kept away from the mostly deep cut valleys by the constellation of mountains. Thus we have in the lowermost, the subtropic zone, which reaches on the average as high as 6,000 feet (under special circumstances, however, 3,000 feet higher), arid steppe and even desert-like tracts, timbered at their best with savannah forest, and exceptionally only, luxuriant woods. Here we have some interesting Primulas. Here is, it seems, the real home of the Malvacea section, although some of its species ascend higher. *P. barybotrys* Hand.-Mzt. is a steppe plant on clay-slate and limestone, in situations where rarely some drops of rain fall, and never snow, and certainly the thermometer never drops to 32° F. *P. bathangensis* Ptgn. grows on the same sites, and was found by me on broken slopes along the edges of thickets on phyllit soil. Both flower in the rains in summer. The Carolinella species, not seen by me in the field, are obviously also at home here. A special habitat is required, it seems, by *P. effusa* W.W. Sm. et Forr., for I found it in wet niches under overhanging conglomerate rocks, flowering in early spring, for it does not depend on rain. *P. subtropica* Hand.-Mzt. I found in the shade of thickets on slate containing lime, in the middle of May already done flowering.

The largest space of the Yunnan plateau is taken up by the cold temperate zone, whilst it is very restricted on the steep slopes in the high mountainous country. We know its climate more exactly by means of the meteorological observations made at Yunnanfu. There the annual precipitation is about 42 inches, the annual mean temperature about 60° F., the maximum in summer 88°, the average temperature of January 48°, the absolute minimum 20°. Snow falls very rarely and lasts no longer than a few days. The minimum of the relative humidity of the air is little below 30 per cent. Thus it is by no means an extremely dry climate, and towards the higher regions the precipitations increase visibly. The climate of Yunnanfu as characterized resembles closely that of the Mediterranean coast, and its influence on vegetation is a very similar one. Primulas are not yet as universal as in the higher and moister situations. The most common, at least in central Yunnan, is *P. androsacea* Pax. Alluvial soil, the mud of which is suited to the growth of rice, is its habitat. Thus it is found often in big masses on the ridges of rice fields, or more accurately of bean fields, for it flowers before the rice is planted; in the same masses on abandoned fields of the same kind; and on the grass patches, green all the year round, alongside the canals of water between them, and along the natural streams. It flowers together with *Vicia Faba* L. in February, but often also in November, and occasionally during the whole winter, seeds quickly, and soon disappears. *Parochetus communis* can be considered its most constant companion. Its nearest relative, *P. Forbesii* Franch., was observed by me in a small spring at the head of a patch of meadow covering very decomposed granite soil. In peculiar localities both are replaced by others, two of which I saw growing: *P. hypoleuca* Hand.-Mzt. which grows in the very shallow part of the Yunnanfu lake on islets of comon reed (*Phragmites communis* Trin.) together with *Iris phragmitetorum* Hand.-Mzt., *Lysimachia thyrsiflora* L., *Eriocaulon Schochianum* Hand.-Mzt. and *Nephrodium Thelypteris* (L.) Desv., and flowers somewhat later in the spring, and *P. Duclouxii* Ptgn., an inhabitant of perpendicular, shady gaps of limestone rocks, which I also found flowering in February as profusely as in November. One gets the impression that it intends to place its seeds by means of its elongated, strongly reflexed fruiting pedicels directly into the mud of its own growing place and to save them from being scattered in unfitted places, as *Cymbalaria muralis* G.M. Sch. drops its seeds into the crevices of rocks. In the cold-temperate zone the group of *P. denticulata* also is at home. *P. sino-*

denticulata Balf. f. et Forr. flowers in hard steppe soil very dry, at least in the first days of March, on limestone, *P. pseudodenticulata* Pax on the contrary in springy swamps, and in other marshy places of slopes, and in the boggy and often somewhat muddy bottoms of ravines on sandstone, marl, and very decomposed volcanic rocks. In somewhat changed forms it also appears in damp meadows on the same substrata still higher up, in the temperate zone. The luxuriant *P. cyanocephala* Balf. f. I encountered twice, once in masses on quite bare slate soil, soaked after rain, on a very steep slope, and then on similar earth on sandstone but more among shrubs. These Primulas flower in spring before the surrounding grass turns green. Quite different is the occurrence of *P. werringtonensis* Forr., the western representative of the well-known *P. obconica*, which has already been mentioned. It always grows in thickets of deciduous shrubs, often along rivulets, preferring soil somewhat covered with leaves, on limestone, sandstone and clay-slate, which, indeed, all may hold lime, and it also ascends higher, up to 10,500 feet, and flowers in April and May. Another species of the Obconica section, *P. flavicans* Hand.-Mzt., I found on sandstone rocks under the shrubs of a cut wayside at an altitude of 8,600 feet near *P. ulophylla* Hand.-Mzt. of the Bullatae section, and flowering with it in the middle of May. *P. blattariformis* Franch. grows on the edges of thickets under luxuriant herbs on sandstone in situations where precipitation is copious. The well-known *P. Bulleyana* Forr. requires more moisture and inhabits damp places, often in thickets on sandstone as well as lime at an altitude of 7,900–8,900 feet. *P. Poissonii* Franch. grows under similar conditions, but also on wet spots of meadows, often even in the springs and along rivulets, but never abundantly. I found it several times even at lower elevations than the former, but up to 9,900 feet, thus almost in the temperate region on different substrata.

To it both as to affinity and occurrence *P. planiflora* Forr. et Hand.-Mzt.* joins on, a characteristic plant of the meadows of the temperate region in N.W. Yunnan and neighbouring Szechuan. In enormous masses it colours the meadows red over large stretches, and these meadows are of quite a characteristic nature. The subsoil is probably always alluvial gravel which fills depressions and valley bottoms, or forms soft alluvial cones, and this is covered by a layer of black earth which is hardly more than one or a few feet in depth. Samples of this earth, collected, one over limestone, the other over sandstone, were analysed by an assistant of Professor LEININGEN at the Vienna High School for Agriculture, and both were found practically free of lime, containing only $\frac{3}{100}$ per cent. of calcium carbonate. The soil shows, however, no considerable amount of vegetable matter.

---

* *Primula planiflora* G. Forr. et Hand.-Mzt. Syn.: *P. Poissonii* J. D Hooker in *Bot. Mag.*, cxviii., t. 7216; Dunn in *Gard. Chron.*, 3 ser., xxxi. 413; Forrest in *Not. R. Bot. Gard. Ed.*, iv. 231, non Franchet.

Delavay's nr. 120, the flowering type of *Primula Poissonii* Franch., which I compared in the Edinburgh herbarium, proved the same as *P. oblanceolata* Balf. f. and *P. glycyosma* Ptmgn.; *P. Wilsoni* Dunn is also not more than a robust form of the same plant. *Primula planiflora*, as shown and described very well in the *Botanical Magazine*, is in the field very distinct from that by the more cylindric corolla tube, the comparatively larger and almost flat limb and yellow ring in the throat. It is very common around Lichiang, Yungpeh, Yungning and up to the Chungtien plateau (Forrest 355, 1819, 2120; Handel-Mazzetti 3045, 4116, 4624), and was, from Mr. Dunn's remarks, already collected by P. Delavay.

This soil, which holds water well, is little dependent on irrigation, and is found mostly in connexion with relatively dry Pine forests which grow in similar or more rocky ground covered with less earth. It might be compared with that of our fens. Other places where *P. planiflora* can also be found are edges of thickets, and the banks of the streamlets and basins on the sinter terraces of Bödö, the withered lime sinter of which has little in common with the black earth. As to the general climate of this temperate region, which on the average extends as high as 12,000 feet, I should explain that it is excessively rainy in summer, so much so that working there is indeed no pleasure, but in winter it has no constant cover of snow. As there are no meteorological stations there, and I visited it only in summer, I can only state the absolute maximum of temperature at 75° F. Yet the winter is sufficiently cold to prevent plants flowering. Here all the Primulas flower in the rainy period, in July and August, but a few here and there sooner; I found, e.g., *P. Poissonii* once at the beginning of June, another time in the second half of September flowering typically. It goes without saying that a single individual of a more tiered Candelabra species flowers during a very long time and sheds seeds several times, like *P. planiflora*, and often growing together with it, *P. Beesiana* Forr. No Candelabra Primula goes higher up than the temperate zone. *P. anisodora* Balf. f. et Forr. loves springy places in and along thickets of *Philadelphus*, *Lonicera*, willows and others, on both limestone and slate. The greater part of Yunnan is formed of kinds of limestone and sandstone, with occasional clay-slates alternating, but I remarked very little difference in the vegetation of these strata. The strong decomposition caused by great humidity in the higher situations may weaken or equalize the chemical differences, just as the red earth arising from the dark paleozoic limestone becomes externally very similar to the product of decomposition of red sandstone. *P. aurantiaca* W. W. Sm. et Forr. also grows on damp spots of meadows, often along rivulets on limestone as well as on slate, and is the only one of its section ascending as high as 11,000 feet. *P. Faberi* Oliv., of the Amethystina section, agrees in its requirements as a meadow plant. I found it on sandstone ground in Szechwan at a height of 9,000 feet. *P. nutans* Delav., of the Soldanelloideae, grows there on stone strewn but earthy slopes rich in herbs on diabasic soil at an altitude of 9,900 to 12,130 feet. A typical member of the temperate zone is also the deservedly famous *P. Viali* Delav. (*Littoniana* Forr.). Around Lichiang it inhabits the same places as *P. planiflora* and often grows together with it, but is very localized there. Its real home is around Yungning, and there it is found in such damp meadows in masses, but is very eurytopic, enters the most varied thickets, even the dense and dwarf evergreen bush of prickly oaks, near Yenyuen,

Photo Handel Mazetti

FIG. 59 PRIMULA BEESIANA Forr.

Growing at 9,000 ft. in Szechwan with *Iris Forrestii* in damp meadow

To face p. 56

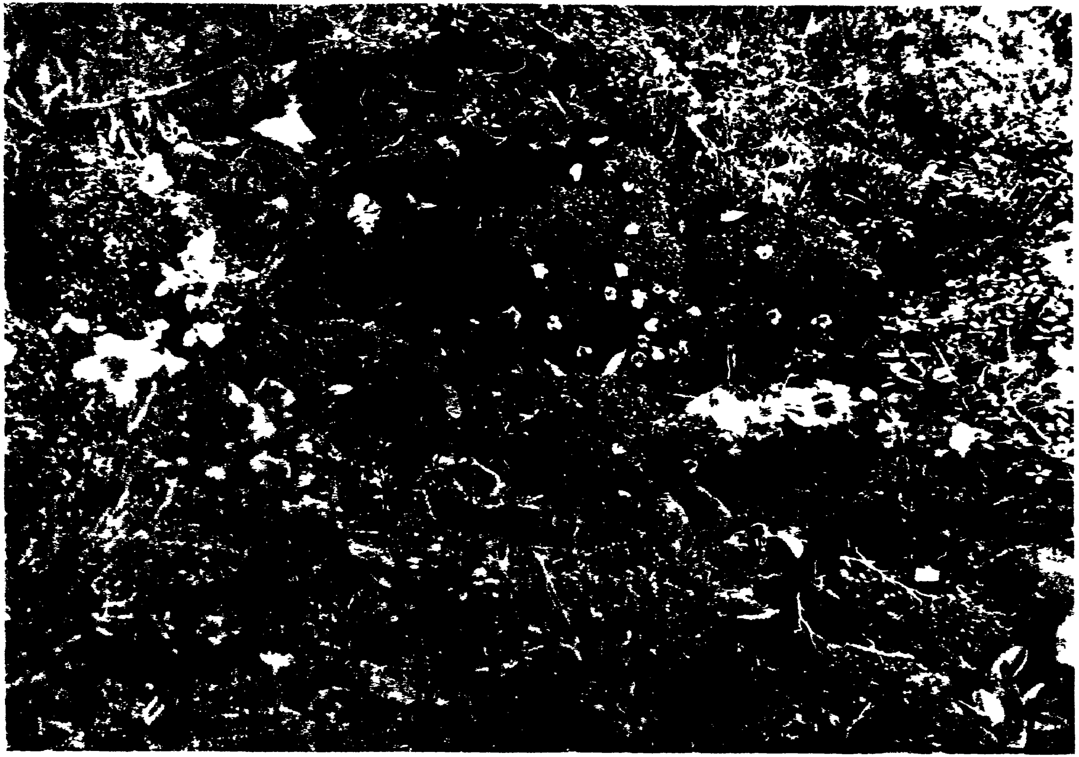


Photo Handel Mazzetti

FIG. 60.—PRIMULA CHRYSOPHYLLA Balf. f. et Forr.

Growing at 14,600 ft. in Chungtien, Yunnan, with *Diapensia purpurea*, *Rhododendron prostratum* and *R. complexum*.

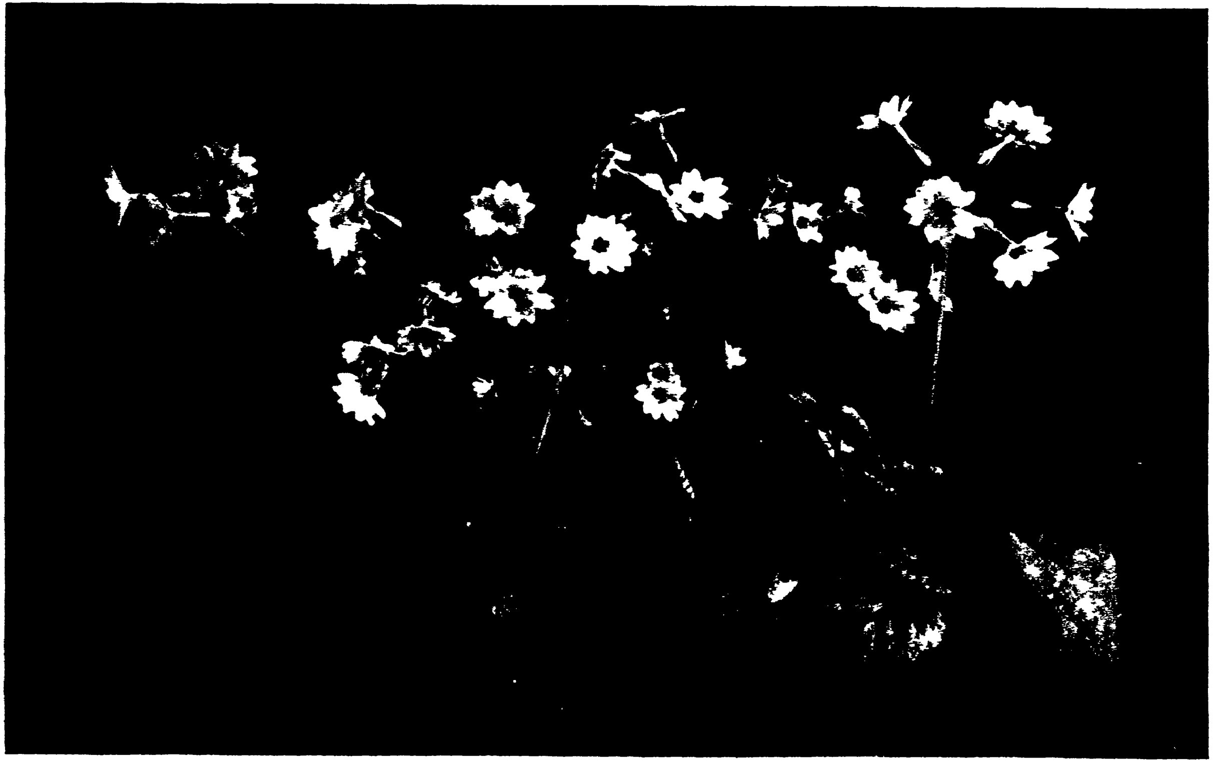


FIG. 61.—PRIMULA MEGASEAEFOLIA AT EDINBURGH.

(p. 20)

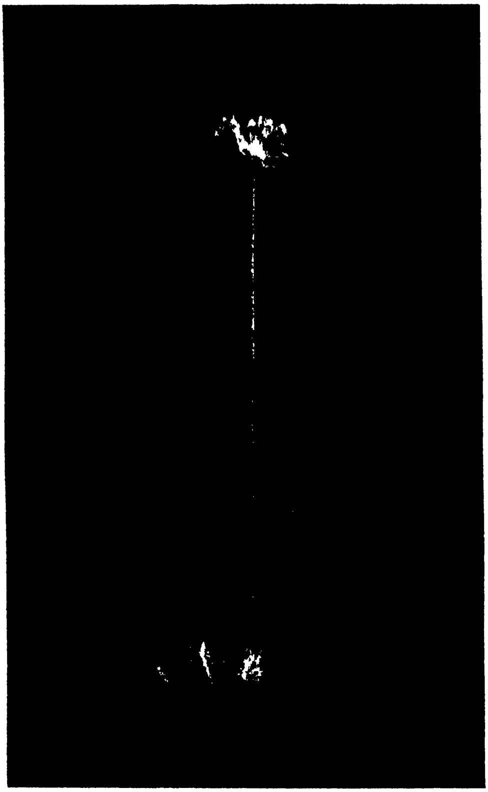


FIG. 62.—PRIMULA PUSILLA Wall.
(p. 29)

[To face p. 57.

and dry stony meadows. It has its easternmost locality on the Santaoshan pass east from there, at 101° 45′ east longitude. It grows at altitudes from 9,250 to 11,550 feet. After this explanation of its habitat it must appear very strange that it is not easy to cultivate. There is no theoretical reason why any plant from its altitude in Yunnan should not be acclimatized without difficulty. In practice, however, we observe the quite unexpected fact that many plants from the low and hot Central China, as *Wistaria sinensis*, *Viburnum rhytidophyllum* Hemsl., *Caryopteris incana* (Thbg.) Miq., *Macleaya cordata* (Willd.) R. Br. do much better even in our rough climate of Vienna without protection in winter. *P. cernua* Franch. is at home also in the temperate zone on rather bare soil in relatively dry Pine forests. It was seen by me only on sandstone. Decidedly wet and cold localities enable two quite different species to descend from higher altitudes, namely, *P. sikkimensis* Hook. and *P. yargongensis* Ptgn. In springs gushing over limestone boulders and filled with aquatic mosses, the names of which—*Bryum ventricosum* Dicks. (*pseudotriquetrum* Schwgr.), *Cratoneurum filicinum* (L.) Roth—say enough to those somewhat acquainted with them, is found *P. sikkimensis*. It is more common in the sub-alpine zone, preferring rivulets near the springs, and on humose places I saw it still on one of the highest spots reached by me, at 15,600 feet, if it was not *P. pseudosikkimensis*, which is difficult to distinguish. *P. yargongensis* (*Wardii* Balf. f.) is a typical swamp plant growing over various rocks which have no effect through the deep and wet cover. I found it once also in less damp deciduous thickets on limestone and sandstone alternating.

Then there are some forest plants: *P. sinolisteri* Balf. f. growing on sandstone in forests of winter-green oaks related to *Quercus glauca* Thbg., amongst the fallen leaves, which, however, on account of their hardness probably have little influence on the soil. *P. crassa* Hand.-Mzt., of the Davidi group, is a plant loving more shade and humus, also growing on sandstone in the bottom of a gully in a forest of similar oaks and many very different trees, together with *Tupistra viridiflora* Franch., *Rohdea urotepala* Hand.-Mzt., *Arisaema lobatum* Engl., *Viola moupinensis* Franch., *Anemone flaccida* Schm., *Eutrema yunnanense* Franch., two *Paris* species and other shade plants. *P. septemloba* Franch. I found on limestone at a higher altitude than either of these, viz. at 11,500 feet, in most luxuriant mixed forest, where hardly any other Primulas grow, especially under the dwarf bamboo which are nowhere absent, on deep soil certainly rich in foodstuffs. Rock plants of the temperate zone are: *P. aromatica* W. W. Sm. et Forr., in damp niches and crevices of limestone rocks, *P. Forrestii* Balf. f., and *P. rufa* Balf. f., in crevices and ledges of limestone rocks, but on drier places, and their long lignescent rhizomes enable them to expand over the barren rock. *P. yunnanensis* Franch., is often a true rock plant content with the smallest cavities on perpendicular limestone rock-walls offering some nutrition. It is not, indeed, confined to such places, but found also on earth of rough broken edges of roads, and in the sandy soil of pine forests, but always as a decided limestone plant. *P. pulchella* Franch. is similar in its requirements, inhabiting the same localities, perhaps confined more to hard, stony soil. Like *P. sikkimensis* the related *P. vittata* Bur. et Franch. is common to both zones, inhabiting swampy places on limestone ground. The closely related *P. secundiflora* Franch. is subalpine and alpine on both limestone and clay-slate on deep humus of depressions and moory edges of clumps of rhododendrons.

The cold temperate or subalpine zone is the zone of fir forests, the upper limit of which is at a height of 13,900–14,250 feet. The snow cover is of short duration here, too. On April 15, I found it almost gone at 14,200 feet, and the first Primulas began to flower. On May 18, on another mountain in Szechwan, there was at the same altitude no snow at all, and the same *Primula*, namely *sonchifolia* Franch., was in full flower. It is indeed especially fitted for early flowering. The broad and thick, succulent leaf sheaths, and the close-set leaves not quite unfolded yet, with the flowers embedded between them, as in a warm nest, offer an effective protection from cold winds, and the growing place is selected with a view to that, in the deep ground of dense fir forests or under a still closer roof of gnarled rhododendron trees about 13 feet high, amongst thick cushions of hepatics and *Dicranum perfalcatum* Broth., and on deep black soil covered by *Rhododendron* leaves, and similar to the alpine turf, neutralizing the differences of the various mineralogic substrata. There it flowers alone so early, sometimes together with *Chrysosplenium Davidianum* Decne., and only on quite open places on rocks warmed by the sun there are some few other flowers opened at the same time. Considering the small amount of snow and the bright sun before the rain period begins, this behaviour is remarkable. The next one flowering at this altitude seems to be *P. calliantha* Franch., in W. Yunnan only, also in fir forests and rhododendron groves, but on firm and less covered soil, no matter whether on limestone or slate, often in enormous masses, colouring large tracts purple. In July flowers *P. muliensis* Hand.-Mzt., perhaps better known to gardeners by the name of *P. Coryana*, in exactly the same conditions as *P. sonchifolia*, lifting its splendidly fragrant flowers, among the largest within the genus, high up, clearly searching for the light which sparingly enters between the trees. *P. hymenophylla* Balf. et Forr., of the Cortusoides group, grows near by on more open and stony lime soil; *P. conica*, Balf. f. et Forr., of the Muscarioides group is a spring plant of normal subalpine meadows. *P. florida* Balf. f. et Forr. grows on sandstone rocks as well as amongst pieces of limestone in subalpine coniferous forests, but flowers in summer, in July. After what I have said already, it is remarkable that most Primulas of the cold temperate zone develop earlier than those of the lower temperate, earlier at least than the species common there. This applies particularly to the tall species of the Nivalis section. They belong to a plant formation which does not conform with any other one known to me from anywhere else, and to which I was obliged to give the special name of " leaf mould pasture."

The soil here consists chiefly of remains of plants, half rotten, and under these completely rotten leaves, and especially the leaf sheaths of the many deep-rooting plants belonging to most various families, and having the bases of their stems enveloped in such. As most characteristic, may be named: *Potentilla leuconota* Don and *P. stenophylla* (Franch.) Diels, *Anemone coelestina* Franch., *Veratrilla Baillonii* Franch., *Souliea vaginata* (Max.) Franch., *Meconopsis pseudointegrifolia* Ward, *Mandragora caulescens* C.B. Cl., *Thermopsis alpina* Ledeb., and *Nomocharis lophophora* (Franch.) Ev. A considerable part is constituted by the Nivalid Primulas themselves: *P. sinoplantaginea* Balf. f. et Forr., *P. leucochnoa* Hand.-Mzt., and less markedly *P. szechuanica* Pax which inhabits also firmer humus on clay-slate. This plant formation is often found on steep slopes and on remarkably dry soil so that it cannot be counted to the moors, although in composition it is somewhat similar to them. It can easily be understood that plants especially adapted to so particular a formation are difficult to cultivate. The mould pasture with its Primulas reaches up into the high mountain zone, till somewhat above the tree limit. *P. sinopurpurea*, however, is also found in caldrons still somewhat moist from the melted snow in deep soil, in the same places where *P. pseudosikkimensis* and *P. pinnatifida* appear later. Before I treat of other high alpine Nivalids, I must mention one more subalpine one, *P. chionantha* Balf. f. et Forr., perhaps the most vigorous. I only saw it fruiting amongst high herbs along streams, always on markedly vegetable substratum, especially between the roots of *Rheum officinale* Baill.

The small high alpine Nivalids, *P. rigida* Balf. f. et Forr. and *P. glacialis* Franch., grow quite differently, on humose places between slate stones, the former in the highest situations, at 15,250 to 15,600 feet, the latter somewhat lower. Similar to these, on still deeper soil in snow caldrons, grows *P. pseudosikkimensis* Forr., also on limestone. *P. pinnatifida* Franch. flourishes very characteristically together with this, but descends also in dense subalpine fir forests down to 13,200 feet. The closely related *P. lepta* Balf. f. et Forr. is a typical high alpine snow valley plant on lime ground. It grows together with *P. cyclostegia* Hand.-Mzt., a high alpine limestone form of *P. bella* Franch., which I observed more in stony pasture. These snow valleys so exactly match those of the Alps that the same must apply to them. They offer fertile soil, containing probably more nitrogen, and can only be formed in places where water can accumulate. *P. brevifolia* Forr. is a pasture plant on limestone as well as on slate ground, and, contrary to those already mentioned, it is one of the first spring flowers of the high region, at the most Anemones, *Oxygraphis glacialis* Bge., and very few others flowering at its side. The beautiful *P. dryadifolia* Franch. is a limestone plant in rather loose scree of the slopes, almost a cushion plant, like *Potentilla articulata* Franch., *Saxifraga drabiformis* Franch., *Solms-Laubachia pulcherrima* Muschl., species of *Cobresia* and others in very high situations. The closely related *P. chrysophylla* Balf. f. et Forr., grows on better earth between slate stones on places sheltered from the winds. Other representatives of this group are in the province of the Burmese monsoon climate, which extends into China as far as to the Mekong.

Let us continue with these high alpines. The high alpine zone treated of so far is characterized by a relatively poor cover of snow in winter and, as it seems, also by little cold even at that time. I had nothing to look for there in the winter, and thus have no personal experience of it, but there is a report of a journey by missionary EDGAR,* who travelled four times in one winter between Tachienlu and Batang, that is farther to the north, in a still more continental country, where the cold certainly increases. He found the passes of 16,500 feet open for loaded animals and only once 0° F., otherwise rarely less than 20° and at noon even 63°. In spite of its situation, even this country is not extremely continental, and there is no continental feature in its vegetation besides the high forest limit. The weakness of the snow cover corresponds to the dry period. Thus the glaciation also is poor, and present only where the heavy precipitations of the summer always fall as snow, that is around the very highest summits. The snow cover is also too slight for avalanches to occur there. Thus snow hardly accumulates sufficiently to lie till the summer, and no snow triangles are formed at the foot of steep ravines such as are found in our Alps.

It is quite different in the *Province of the Burmese Monsoon Climate* around the Burmese-Tibetan frontier, in the ranges between Mekong, Salween, and Irrawady. There we have snow several yards deep until June, strong glaciation, and avalanche tracks which break in upon the forest region and allow only limp bushes to thrive, accompanied by certain herbs among which there are some Primulas. I spoke lastly of the Dryadifoliae, and of these we have in the Burmese monsoon province also high alpine representatives. *P. mystrophylla* Balf. f. et Forr., and *P. cycliophylla* Balf. f. et Forr., both on mica slate on elevated ridges form extended cushions between grass patches, the second also amongst patches in depressions on granite soil. An inhabitant of pastures, like the related *P. brevifolia*, is also *P. Valentiniana* Hand.-Mzt., flowering at the same time as these in the heavy rains at the beginning of July, together with *Rhododendron campylogynum* Franch. Like this, and not far from it, grows on granite at a height of 13,500 feet, the small *P. Genestieriana* Hand.-Mzt., a near relative of our *P. farinosa* L. In the system there joins on to *P. Valentiniana, P. silaënsis* Ptmgn., a subalpine swamp plant on mica slate, more rarely on steep alpine lawns on limestone, between 11,200 and 14,100 feet, flowering in June till July. *P. Dickieana* Watt was found, but rarely, in the cold temperate zone, which with its fir forests can be closely compared with that of the other parts of Yunnan, and South-West Szechwan, but is also much damper, in the grassy turf on mica slate, particularly along avalanche tracks, together with *Pogonia yunnanensis* Fin., *Pleione scopulorum* W.W. Sm., *Leontopodium Jacotianum* Bvd. var. *minus* (Bvd.) Hand.-Mzt., *Utricularia salwinensis*

---

* *Jour. N. China Branch Roy. Asiat. Soc.*, xlv. (1914), pp. 57–64.

Hand.-Mzt., *Vaccinium modestum* W.W. Sm., and Gentians, not long after the snow melted. To finish with the high alpines, I must mention *P. limbata* Balf. f. et Forr., which grows on bare limestone rocks at 14,000 feet, exactly like *P. Auricula* L., and had done flowering at the beginning of August. On the same mountain and probably in the same places has been found the cushion forming *P. Dubernardiana* Forr., not by me but by Mr. FORREST. Close by grew *P. chrysopa* Balf. f. et Forr., which I could not distinguish from *P. gemmifera* Bat., in steep and not very damp pasture up to 14,000 feet. One more is partly high alpine, *P. vernicosa* Ward, flowering immediately after the snow melted, in the very snow water, amongst slabs of slate, at an altitude of 13,850 to 14,450 feet, together with *Pegaeophyton sinense* (Hmsl.) Hay. et Hand.-Mzt. (*Braya sinensis* Hmsl.), which, however, develops much later, but the Primula also grows on bare earth of open fir forests down to 11,850 feet, on the same ground. In the uppermost thinned forests of Firs and Rowan trees, amongst the roots of trees in deep humus covering mica slate, I collected soon after the snow melted, *P. humicola* Balf. f. et Forr. *P. sphaerocephala* Balf. f. stood scattered over a grassy clearing of the forest at 11,800 feet, in the middle of September still in flower. *P. muscarioides* Hemsl. again is a swamp plant growing amongst willows along streams down to 10,900 feet, flowering in June, but is said to grow elsewhere in other places, too. A typical subalpine plant of avalanche tracks is the beautiful *P. Agleniana* Balf. f. et Forr. In a small valley, one of the last ramifications of the deep-cut Ch'iontson-lumpa, on the way from the Salwin to the Irrawady, which, although it rained deplorably and the river was the only road, impressed me deeply as being one of the most beautiful flower gardens, it stood in masses at an altitude of 11,500 to 13,000 feet, on rather stony soil, protected as a bud by its large leaf sheaths, and now partly by branches, and the roof of leaves of dwarf Cherry scrub, which is peculiar to this country, and Rhododendrons, at the lateral slopes near the stream, blooming in the alpine spring, but much after the snow melted. *P. serratifolia* Franch. grows quite similarly under Rhododendrons. *P. flexilipes* Balf. f. et Forr., in similar situations keeps more along the watercourses themselves at an elevation of only 9,700 to 10,400 feet, and flowers in summer. *P. microloma* Hand.-Mzt. is a pronounced forest plant still in the cold temperate zone under Rhododendrons in Fir forest, 11,500 feet, flowering in the beginning of July, and is rare, as it seems. In the bamboo undergrowth of the Fir forests on very loose soil covered with leaves and needles on the slope to the Irrawady up to 12,550 feet grows *P. eucyclia* W.W. Sm. et Forr. of the Geranioides group. It was completely over by this time. Under exactly the same circumstances I found in the Salwin country *P. praticola* Crb. There still remain of my collection *P. euosma* Crb. and *P. dumicola* W.W. Sm. et Forr., which I found on granite rocks along rivulets in the dripping cold temperate mixed forests above the Irrawady between 8,000 and 9,000 feet, already fruiting in the beginning of July.

Ladies and gentlemen, the question which of the Yunnanese Primulas is the finest is an idle one, for the beautiful features of those which enter the final struggle are too different, and are incommensurable. But besides the Rhododendron, Cremanthodium, Corydalis, and the uncultivable Pedicularis, all are amongst the most impressive natural beauties presented by these wonderful mountains, and I conclude, wishing you may succeed in transplanting here very many of them, and that you may enjoy them without the evil accompaniments of sandflies, leeches, and Chinese soldiers, which can put out of conceit with the work in the field all those who are less enthusiastic for nature.

* * * * * *

The CHAIRMAN said: I am sure Dr. HANDEL-MAZZETTI'S paper will make us all envious of his travels. He is one of the best qualified people in the whole world to speak about Chinese Primulas at home, and I am sure we shall all envy him, too, that first-hand knowledge of the Primulas, not only because he has that knowledge, but because he has had the privilege of seeing them at home.

Before I attempt to thank Dr. MAZZETTI for this wonderful paper, I am going to ask you if you wish to put any questions to him; I am sure he will be pleased to answer them if he is able.

Mr. MULLIGAN: I should like to know what is the colour of *P. werringtonensis.*

Dr. MAZZETTI: It is rose-coloured, but it has a considerable amount of variation.

Mr. MULLIGAN. Captain KINGDON WARD described it as a deep crimson.

The CHAIRMAN: It is a pale crimson, more like a coloured *P. obconica.*

Mr. HARROW: I should like to ask Dr. MAZZETTI something about *P. euosma.* Can he tell us the colour and the habit?

Dr. MAZZETTI: I am afraid I do not know the colour.

The CHAIRMAN: On your behalf I thank Dr. MAZZETTI for his very excellent paper. I only hope we shall be able to benefit by the knowledge that we have now gained of the natural haunts of the Primula. Our difficulty always lies in trying to imitate the natural home. We cannot bring the natural climate, and we have to substitute an artificial home to make up for the lack of it; but it is always better to know what sort of a climate and what sort of surroundings the plant has had in its own home before we attempt to supply the artificial substitute. On your behalf I thank Dr. MAZZETTI for the great addition he has made to our knowledge of the homes of the Primulas.

ASIATIC PRIMULAS FOR THE GARDEN.

By the Hon. H. D. McLAREN.

I HAD great hesitation in accepting the Council's invitation to read a paper at this Conference, because no one is more aware than myself that neither am I a botanist nor am I a skilled cultivator of Primulas. I can only plead this, that I have had during the last few years opportunities of observing the results of the skill in cultivation displayed by many of my friends, notably such men as Mr. MUSGRAVE, Mr. HARROW of Edinburgh, whom I see here, Mr. PUDDLE, and other great gardeners.

A friend of mine was telling me of his gloomy gardener who on one occasion was observed to smile. The owner of the garden asked him what had happened to certain plants which he had given him to grow some few months before, and a broad smile overspread the gardener's features and, in a voice which betrayed the very greatest pleasure and satisfaction, he said, "Sir, they're all dead!" I think a gardener such as that would have one long laugh if he tried to cultivate the more difficult of Primulas.

Those who have studied the Proceedings of the last Primula Conference will be surprised and pained to see how many of the species then shown have passed out of cultivation in this country. The explanation of this is that most Primulas, while they have a vigorous childhood, have a weak old age. Of even the most difficult of Primulas it is possible to winter a proportion, at any rate, of seedlings under glass, if not in the open; but after the plants have flowered they lose vigour and are more susceptible to decay, and it is then extremely difficult to keep certain species alive. If therefore such species are to become established in cultivation they must be capable of being treated strictly as biennials, fresh stocks being raised from seed.

Most of the species we have lost have not produced seeds freely, the capsules containing no fertile seeds.

Take for example the species *P. Reidii* and *P. Baileyana*: they are both extremely difficult, if not impossible, to winter out of doors, and plants that have flowered will not, in my experience, winter, without many casualties, even under glass. Now *P. Reidii* will seed fairly freely, hence it remains in cultivation; but *P. Baileyana* is a poor seeder, and I doubt whether many plants will be in cultivation this time next year. Some species propagate themselves by off-sets as well as by seeds—*i.e.*, in garden parlance, they form clumps; and if they have in addition a good constitution they are plants which succeed with the least enterprising of gardeners.

But when all is said and done seed-raising is the royal road to success in the cultivation of Asiatic Primulas. Add to this a cold frame or house where difficult species can be kept dry in winter, and many of such species will be within reach of a skilful cultivator. Possibly success might be attained with an even greater number of the difficult species if they could be wintered in a refrigerator, but this method of treatment has not, so far as I know, yet been tried.

Now, although of many of the best-known Primulas we have so much seed, and it germinates so easily that almost any method of treatment yields a crop of seedlings, yet of others we may desire that the seed, by reason of its scarcity, has every possible chance. For this purpose the following suggestions are, in my experience, worthy of adoption:

(1) The seed should be sown as soon as ripe.
(2) It should be sown in well-drained pots with a liberal quantity of sand in the compost.
(3) The compost should contain plenty of humus in the form of sweet leaf soil.
(4) The seedlings should be pricked out before they become drawn through overcrowding.
(5) The seedlings (coming as they do from plants native to a country where they are frozen solid in winter) should be kept in winter free of overhead moisture and should not be over-watered.

So much for the raising of Primulas.

All gardeners have the ambition to naturalize plants—that is to say, so to arrange that the plants may be put out in the wild and may, thereafter, establish themselves permanently without further attention. This ambition is but seldom realized, and Primulas form no exception to the rule. I can recollect seeing Polyanthus naturalized in a park in Cornwall, and *P. japonica*, *P. pulverulenta*, and *P. helodoxa* naturalized and seeding themselves in a wood. Possibly in favourable situations one or two other species might do the same.

In most districts, and with most species, however, all one can do if one wants to grow Primulas amongst natural vegetation is to plant seedlings out and to keep renewing them from time to time as they die out. *P. rosea* persists fairly well in these conditions. *P. pulverulenta* and *P. japonica* persist in woodland vegetation, and so, probably, would *P. Florindae*.

But of the bulk of the Primulas it is true to say that they do far better in a bed, and that the bed provided for them should not be too much under the drip from trees or exposed to too much sun, and that it should be watered in times of drought.

Under these cultural conditions a large number of Asiatic Primulas are garden plants that can be cultivated without an undue amount of trouble.

I should like to deal now very briefly with the horticultural merits of certain individual species of Primula, and I should wish to refer

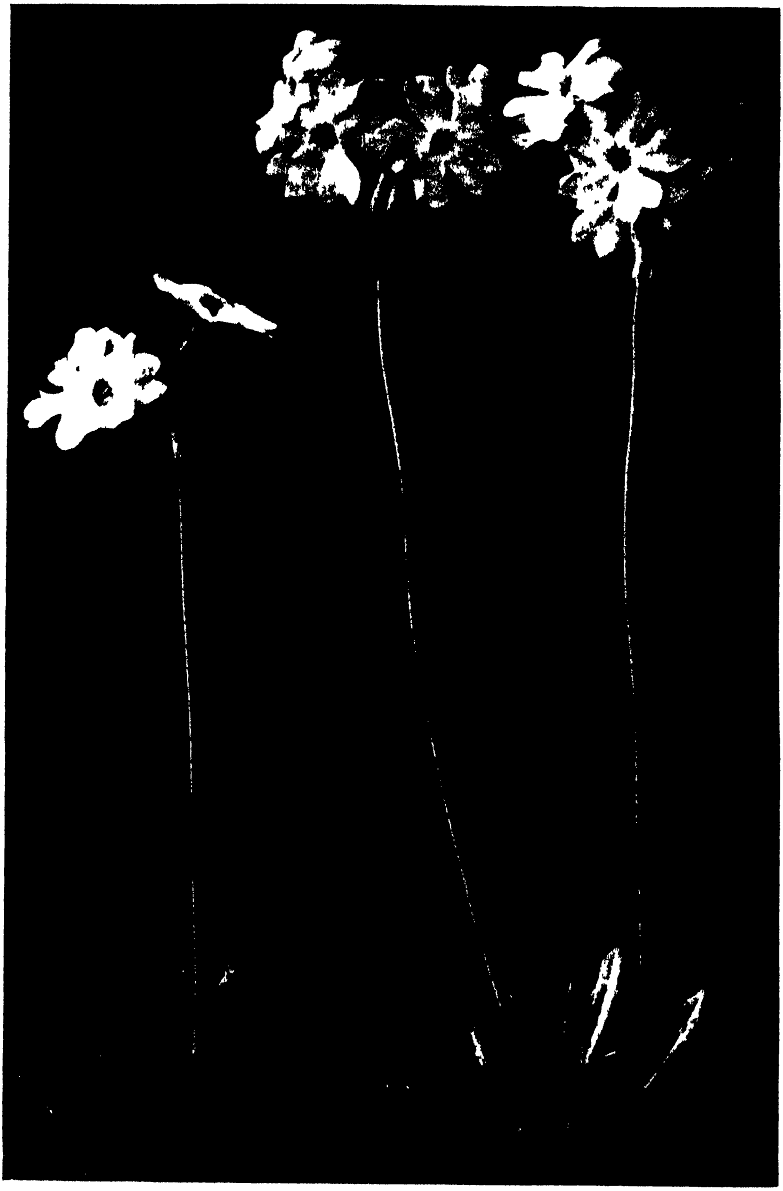


FIG. 63. PRIMULA YARGONGENSIS Petitm.
(p. 33)

[*To face p*. 64.

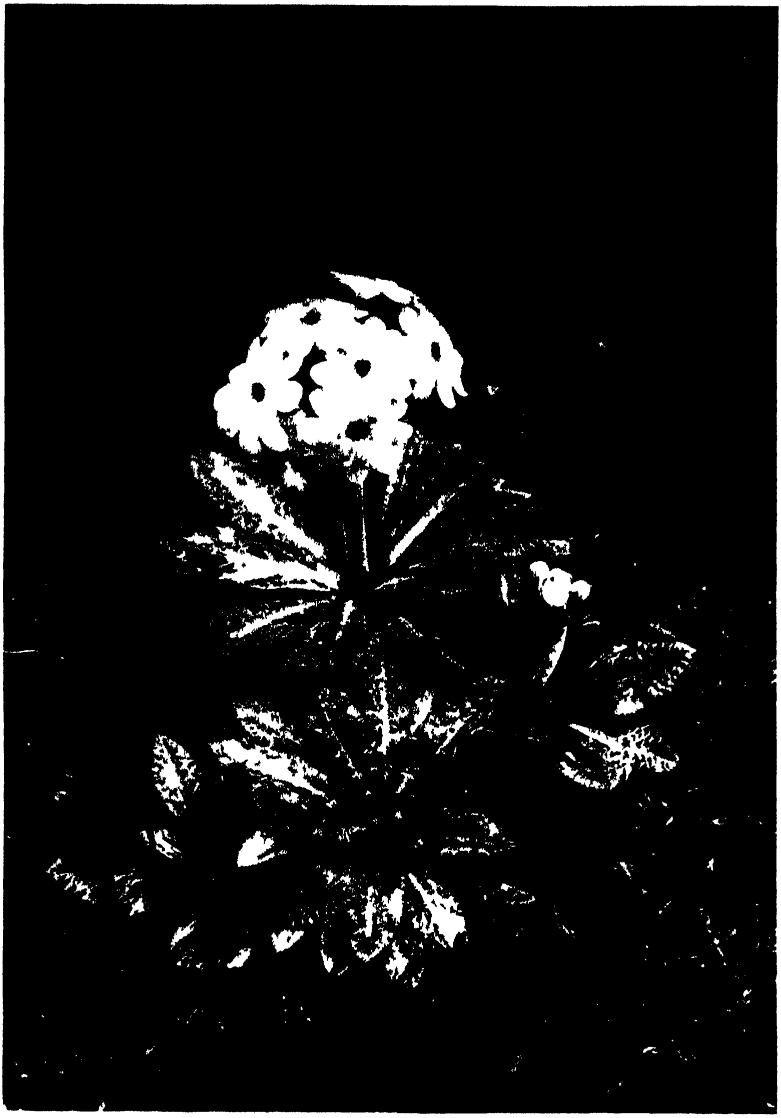


FIG. 64.—PRIMULA ATRODENTATA AT WISLEY.
(P. 34.)

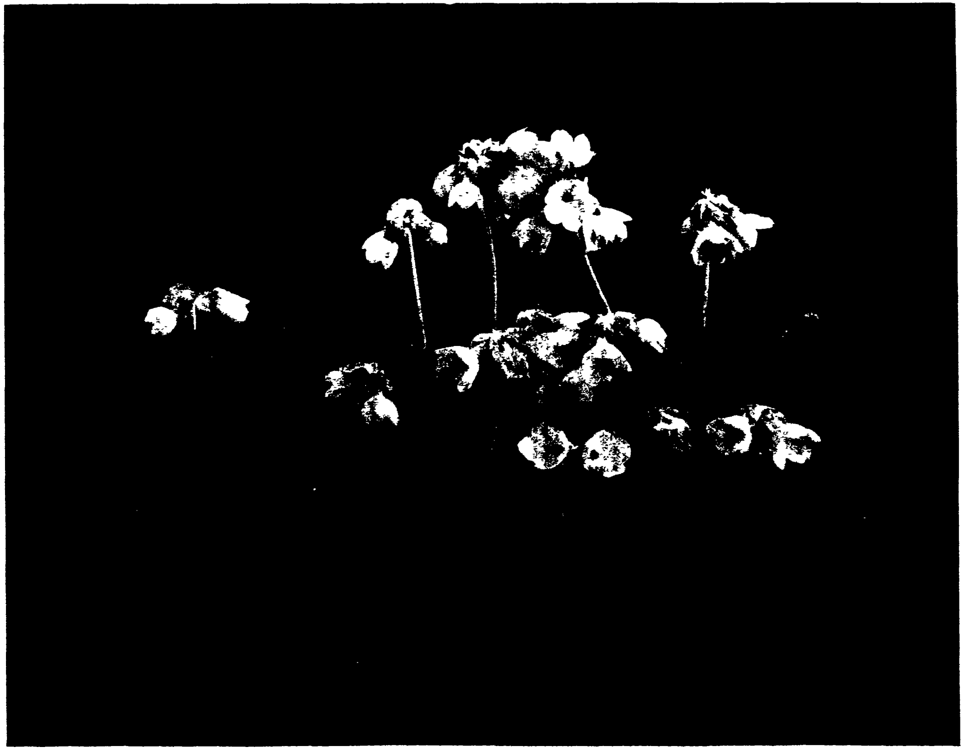


Fig. 65.—Primula Reidii at Edinburgh.

(p. 37

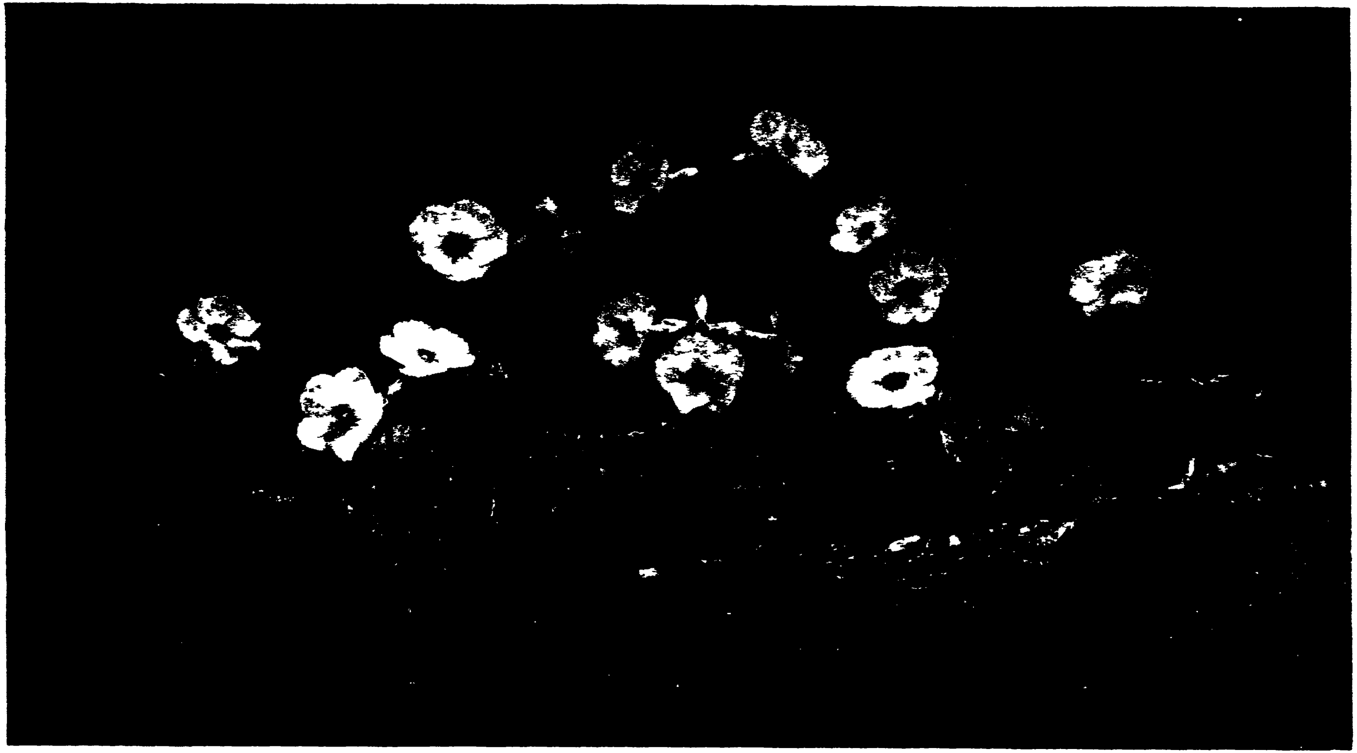


FIG. 66.—PRIMULA CARDIOPHYLLA Balf. f. et W. W. Sm.

(p. 37)

to them under the sections in which they have been placed by Professor Wright Smith and Mr. George Forrest in their recent contribution to the Notes from the Royal Botanic Garden, Edinburgh. Those of us who grow Rhododendrons know the deep debt of gratitude that we owe to Professor Bailey Balfour for establishing for us sections in the genus Rhododendron, and those of us who grow Primulas are under a similar debt of gratitude to Professor Wright Smith for his recent work. In Primulas, as in Rhododendrons, it is interesting to observe in how many cases the cultural requirements follow the botanical relationships, at any rate in those cases where the species come from one part of the world.

The Candelabra section certainly provides more of the easily grown and decorative species of Primula than any other, and this section is, therefore, chiefly relied on by those who grow Asiatic Primulas for garden effect.

Of *P. pulverulenta* and *P. japonica* I need only say that care should be taken to grow the best forms : of the former an exceptionally beautiful pink strain has been produced by a process of selection at a Hampshire nursery ; while of the latter the deep red and the white forms are well known, while there is also a very good rose-pink strain.

P. Bulleyana flowers later than the last mentioned, and, although we have not found it quite so free a seeder as some others of its relations, it is an easy plant to cultivate and a first-class acquisition for the garden.

P. burmanica, although somewhat aggressive in colour, is equally easy (in spite of a name suggestive of the tropics), and often has a second flowering season in autumn.

P. Miyabeana is not worth growing, being easily the least ornamental of the section, and *P. imperialis* is not hardy.

P. Cockburniana and the nearly allied yellow-flowered species *P. chungensis* are smaller in growth. The old form of the first named is almost invariably biennial. Captain Kingdon Ward, however, in more recent years has introduced a superior form with somewhat brighter and larger flowers and a far better constitution, inasmuch as in the open ground it will produce offsets and form clumps for a second year's flowering.

Of the group nearly allied to Poissoni, *P. Poissoni* itself is the best, although for garden purposes they are much alike. All are easily grown, as is *P. anisodora,* with its small and almost black flowers. This latter has produced in gardens a natural hybrid with *P. helodoxa* with flowers of salmon colour. The hybrid proves infertile, and can only be propagated by division.

Lastly, of this section, the fine yellow *P. helodoxa* is a plant that should be cultivated by everyone interested in Primulas. It likes more wet than do most, is fairly easy to establish, and is, on the whole, of better colour and with a larger flower than its near ally, *P. Smithiana.*

In the Bullatae section the plants are of shrubby habit, and are valuable for their strong scent and free-flowering qualities.

The species in fairly common cultivation are *P. Forrestii* (yellow), *P. rufa*—hardly distinguishable from it—and *P. redolens*, which opens pale lavender and fades to white.

Unlike the majority of Primulas these species must have full sun, and as they also require the best of drainage they are best grown in the chinks of a dry wall facing south or west.

Of the CAPITATAE *P. Mooreana* is so much the best for garden purposes that the others may be left to those who wish to grow a botanical collection.

The dark blue-purple flowers of *P. Mooreana* are produced from July till late October, but unfortunately in the open few plants survive the winter after flowering.

Primulas of the CORTUSOIDES section are for the most part woodland plants and not bog plants. *P. Veitchii* and *P. lichiangensis* and its variety *hapala* are for garden purposes practically alike. The species in cultivation are not strikingly ornamental, but are not difficult to grow.

Primulas of the DENTICULATA section are noteworthy in being among the first of the Asiatic species to flower in spring. *P. denticulata* has many forms and sub-species, of which *P. denticulata magnifica purpurea*, a selected variety raised by Messrs. BAKER, is noteworthy. The white form of the species is also very lovely.

P. limnoica is a beautiful member of this section.

The FARINOSAE section is remarkable for the fact that the type plant *P. farinosa*, with its sub-species, is found in such widely separated districts as the Straits of Magellan, Greenland, Scotland, and Siberia. It is a plant for careful cultivation in the rock garden. The most useful members of this section are the well-known *P. rosea*, a plant which likes a damp position, and the group of which the Himalayan *P. involucrata* is the best known. This white-flowered species is for garden purposes very much akin to the mauve-flowered *P. chrysopa*, *P. sibirica*, and *P. tibetica*, of which three *P. chrysopa* is the best, although perhaps it is the least known.

P. Genestieriana, collected by Captain KINGDON WARD under his number K.W. 6910, though at present rare in cultivation, is a charming miniature species which seems to be easy to grow. It forms clumps and is a good perennial.

P. luteola, a yellow-flowered member of the section, is easy and ornamental.

In the MUSCARIOIDES section *P. Littoniana* is unlike any other Primula in appearance, and is fairly easy of cultivation. Some prefer the giant form, with its paler colour, and others the dwarfer and brighter form.

The remaining members of this section in cultivation are for the most part smaller-flowered plants which may well be cultivated in the rock garden; they like a well-drained situation in winter.

The three prettiest species among these are *P. atricapilla* (K.W. 5760), *P. Menziesiana*, and *P. deflexa*.

These plants have a welcome habit of making offsets after their spring flowers are over, which offsets flower in the summer.

Of those of the NIVALES section which it is possible to cultivate (and they are but few), *P. chionantha* is by far the most useful garden plant. One of the most beautiful of all Primulas, with its cream-coloured blossoms, jade-green powdered leaves, and delicately pencilled calyx, it flowers in the early spring, and is a free seeder. It likes a well-drained place in winter, and is fairly perennial. It varies a good deal, and the best forms should be carefully chosen for seed purposes.

P. sinoplantaginea, *P. sinopurpurea*, and *P. melanops* are nearly allied species of mauve or pale purple colouring. They are not quite as easy in cultivation as *P. chionantha*, but they are quite possible, and look well mixed with the latter.

Seeds of *P. Stuartii* and of its purple form have recently been reintroduced, but of its behaviour under cultivation I have as yet no knowledge.

P. szechuanica and *P. Maximowiczii* are, as the old books have it, "plants for the curious," that is to say, they are of little value for garden purposes.

Of the PETIOLARES section *P. Winteri* alone is in cultivation. One of the most beautiful of all Primulas, flowering in midwinter, impossible to grow unless in just the right situation and, if so, not too difficult. It must be kept dry overhead and moist at the roots, and should therefore be planted under an overhanging rock. It does not miss the sun. It is a variable plant and a good form should be grown.

The SIKKIMENSIS section ranks with the CANDELABRA section as providing many of our best garden plants. The old "type" plant of the section, *P. sikkimensis* itself, is hard to beat; indeed in flower I think it the most ornamental of the section. *P. Florindae*, however, is a larger growing plant with finer leaves, while the plant that is probably a natural hybrid between *P. Florindae* and *P. microdonta* var. *alpicola*, and which received an Award of Merit not many months ago as *P. microdonta* var. *alpicola*, is also a fine thing. The true *P. microdonta* var. *alpicola* and its violet variety are smaller, but almost equally easy to cultivate, while *P. secundiflora* and *P. vittata* give a fine purple colouring. KINGDON WARD'S *P. Waltoni* is of a ruby shade, and is one of the most ornamental. Its poor relation, *P. prionotes*, should be avoided, as its flowers are smaller and are dull in colour.

All the species in this section like a fairly moist position.

The SOLDANELLOIDES section has given us for cultivation two of the most beautiful of the genus—*P. nutans* and *P. Reidii*. *P. Cawdoriana*, also beautiful, is rapidly dying out since its introduction by Captain KINGDON WARD.

P. nutans requires a well-drained site, and is being grown successfully out of doors, although it is rare in cultivation. Its powdered-blue spike, reminding one of a Chinese pagoda with its drooping bells, lasts long in beauty.

P. Reidii is a dwarf plant, to be cultivated only under glass, bearing large cream-coloured bells in spring.

Finally, may I say that from a garden point of view I rank the genus Primula very high indeed. Of course such matters are largely questions of taste, but, speaking personally, I should put Primulas with Rhododendrons, Roses, and Lilies as the four most indispensable genera in the garden.

The CHAIRMAN : Before conveying your grateful thanks, I suggest that we might invite some questions or remarks on this paper. I think Mr. MUSGRAVE may have something to tell us that will fit in very naturally at this juncture ; I hope he will do so.

Mr. MUSGRAVE : I should be very grateful to Mr. MCLAREN if he could give us any information as to those Primulas which like lime in the soil, or which do well in lime. I believe I am right in saying that *P. Forrestii* does excellently in lime, and I think I am right in saying that it comes from a limestone district ; I am not sure. I have seen it growing exceedingly well in chalky soil, and I cannot help believing it is really a lime plant. As for the others, I am absolutely at sea, except this, in cultivation it is my own very small experience that *P. nutans* does best when it is grown in a soil mixed with lime. I am quite certain of one thing : if you wish to kill *P. nutans*, you can do so with the greatest ease in the world by planting it in leaf soil or peat. You can grow it in plain loam all right, but I am quite clear that you can kill it in leaf soil. I have tried it in both and find that the ones in lime will survive at any rate through a winter, and have survived with me for three or four winters out of doors, but the ones in leaf soil will flower and then die. Any information we can have on the subject of lime with regard to the soil will be of supreme interest to Primula growers.

Mr. MCLAREN : I am afraid I have no experience with regard to lime. We grow Primulas chiefly in leaf soil, including *P. nutans*. Whether they will survive in that compost after they have flowered remains to be seen ; perhaps next spring we shall be sadder but wiser men.

My own experience of *P. Forrestii* has been seeing them in my friend Mr. STERN's garden, where, as you know, it does admirably, and where I have seen the biggest plant of *P. Florindae* that has ever come to my notice. Indeed I suggested the owner of the garden should be photographed standing in the shade of his Primula.

The CHAIRMAN : *P. Forrestii* does grow on lime, and it does very well with Mr. HANBURY in his sandstone cliffs, where there is no lime ; let us hope it is one of those plants that can be happy with either.

PRIMULAS AT WISLEY.

By N. K. GOULD, Wisley.

THE object of this short paper is to convey an idea of the way in which some of the more recently introduced Primulas and some of the older ones of horticultural value have responded to the efforts that have been made to establish them at Wisley. With some we have been successful, and a certain number of species have settled down and become thoroughly at home, finding the conditions of life well suited to their requirements. With many this has not been the case. It has not been unusual to find that a given species germinates well, yielding healthy little plants which arrive at the flowering stage without mishap, but which are not prepared to face a second season of growth. Some of these have died without leaving seed, and are consequently lost for the time being. There is another class, more encouraging, which will grow happily enough in a cool house, but which does not take kindly to open-air treatment. For some of these we may yet hope to find suitable outdoor environment. Field notes supplied by collectors give valuable information as to the conditions of soil and climate under which Primulas flourish in their native habitat, but how seldom is it possible exactly to reproduce these conditions in the garden. Where this cannot be done, some species will never become " garden plants " in the accepted sense of the term, but nevertheless, enthusiasts will never tire, so long as material may be available, of trying to reconcile these more " difficult " plants to more or less uncongenial surroundings. Details of treatment, even in the cases of failure, may, therefore, not be without some value in future attempts to solve similar problems.

Many of the Primulas with which this paper deals are of Eastern Asiatic origin and have been described since the last Primula Conference. In addition to these, some which were then known but were not in cultivation have found their way into our gardens. Most of the newer species at Wisley have been raised there from seed collected between 1917 and the present year. These seeds formed part of the collections of the late Mr. REGINALD FARRER, of Mr. GEORGE FORREST, and of Captain KINGDON WARD ; and in addition to those a few have been received from other sources. By far the greatest number were received from FORREST in the latter years of the war. It was inevitable that at such a time, with its attendant shortage of labour, records of the development of individual plants should be fragmentary, but for every packet of seed sown a record was kept of the dates of sowing, of germination if any, of later cultural treatment and of flowering and future development. Much of the seed received during that period was of species such as *P. Beesiana* and *P. Bulleyana* already well known in cultivation. These supplies made possible the distribution from

Wisley of large numbers of seedling plants in addition to the replenishment of the garden plantings.

In the preparation of these notes the species have been arranged in the sections recently defined by Professor WRIGHT SMITH and Mr. GEORGE FORREST. For convenience the sections are dealt with in alphabetical order.

Amethystina Balf. f.—None of the species of this section is at present in cultivation at Wisley. *P. silaensis*, Petitm. was raised from FORREST'S seed but lived for a short time only without flowering.

Auricula Duby.—This section is well represented by a large collection of species, varieties and hybrids, both in the alpine house and in the rock garden. These are for the most part familiar plants and few present any cultural difficulty. The stock was enriched last year by the addition of various plants collected in the vicinity of Mt. Cenis by Mr. J. HARRIS, who until recently had charge of the Wisley rock garden.

Bella Balf. f.—*P. bella*, Franch., has occasionally been grown as an alpine house plant, but does not persist for any length of time.

Bullatae, Pax.—This section has provided several good garden plants. *P. Forrestii*, Balf. f. is probably the best known and calls for no very special cultural treatment. It may be grown as a pot plant, but is better adapted to planting in high positions in the rock garden or on a dry wall. Here it develops long rhizomes, clothed with the remains of dead leaves and scapes. Very similar is *P. rufa*, Balf. f., perhaps a larger plant with taller scapes and to be distinguished by its cuneate leaf-base from *P. Forrestii*, which has a cordate leaf-base. These two species are grown at Wisley. The only other member of the section I have seen at Wisley is *P. Dubernardiana*, G. Forrest. This is a dwarf species with pale lilac or rose-coloured flowers. It was successfully managed in frames but never flourished in the open.

Candelabra, Balf. f.—The *Candelabra* section is, horticulturally, one of the most important, for among its members are many first-rate garden plants, mostly of vigorous growth and giving a long period of flowering and great diversity of colour. For a long time the extensive plantings of *P. japonica*, A. Gray, have been a feature of the spring at Wisley, and these, together with *P. pulverulenta*, Duthie, have long been naturalized in the wild garden, particularly on the margins of shaded ponds and ditches. On the lower and moister parts of the rock garden are groups of the very popular pink and red strains of *P. pulverulenta*. *Primula Beesiana*, G. Forrest, *P. Bulleyana*, G. Forrest, and *P. Cockburniana*, Hemsl., are all well represented in various parts of the garden. In addition we have the following less common species. *P. anisodora*, Balf. f. et Forrest was raised in 1918 from FORREST'S seeds. It is a glabrous member of the small purple-flowered series including *P. Poissonii*, Franch. and its subspecies *P. glycyosma*, Petitm. *P. anisodora* and *P. glycyosma* are both comparative newcomers to cultivation, although *P. Poissonii* was the first of the purple-flowered species to be introduced. All are grown at Wisley but none is highly ornamental. The deep red-purple flower of *P. anisodora* with its clear yellow eye is striking. Of the yellow-flowered species, *P. helodoxa*, Balf. f. is the most handsome. It has been collected by FORREST in Yunnan and by WARD in Upper Burma, and is closely allied to the East Himalayan *P. Smithiana*, Craib, a somewhat less robust plant. Both are planted on the banks of ditches in the wild garden. We have had *P. serratifolia*, Franch., a pretty plant of unusual flower-colour—pale yellow with a stripe of orange-yellow on each petal. *P. chungensis*, Balf. f. et Ward is the latest addition to the yellow-flowered Candelabras at Wisley. Raised from seed collected by WARD in 1925 the plants flowered while quite small, and those put out in moist, semi-shaded places have made themselves at home there. It is a rather slender species, somewhat in the way of *P. Cockburniana*. The 10-inch scape is dusted with yellowish meal and carries several whorls of bright orange-yellow flowers flushed externally with red. It is in flower with the earliest of the japonicas.

Capitatae, Pax.—This section comprises *P. capitata*, Hook. and several subspecies. So far as their requirements and behaviour in cultivation are concerned they are similar, and form an easily grown group of summer-flowering plants. Some members of the section are of superior merit: the best is probably *P. Mooreana*, Balf. f. et W. W. Sm., a large, late-flowering plant with bold foliage, white on the underside like that of *P. capitata*, but with a scarcity of meal on the upper surface. Both of these, as defined by BALFOUR and WRIGHT SMITH, have an open corolla-limb, as distinct from the funnel-shaped corollas of *P. lacteocapitata*, Balf. f. et W. W. Sm., and *P. sphaerocephala*, Balf. f. et W. W. Sm. *P. crispata*, Balf. f. et W. W. Sm., is a large plant with leaves green on both surfaces. All those I have mentioned have, I believe, been grown at Wisley, but variation in leaf- and flower-character as well as in the degree of mealiness is by no means uncommon, and makes sharp distinction between the forms difficult.

Cortusoides, Balf. f.—Of this section one need say little. Those of its members in cultivation, such as *P. Veitchii*, Duthie, *P. Sieboldii*, E. Morren, and *P. cortusoides*, Linn., are familiar. They are not difficult to grow, but their flower-colour is uninspiring, and they perhaps lack interest on that account. As well as the three already mentioned we have had *P. sataniensis*, Balf. f. et Farrer, *P. heucherifolia*, Franch., and its subspecies *P. humicola*, Balf. f. et Forrest, and more recently two newer species. These are *P. eucyclia*, W. W. Sm. et Forrest, and *P. latisecta*, W. W. Sm. The latter came from WARD'S 1924–5 expedition. It has a good flower with conspicuous white eye. *P. eucyclia* is very distinct. It forms a tiny plant like a seedling Geranium. The flowers are deep rose with a yellow eye, and have quaintly fringed petals. It is an interesting little plant, but rare, and does not look robust enough ever to become common.

Denticulata, Balf. f.—The Denticulata section includes some of the best of the early-flowering Primulas. *P. denticulata*, Sm. is the best known and is widely planted at Wisley, where it thrives without much attention. It is at its best in open positions near water and planted where its early flowers can benefit by the protection offered by neighbouring shrubs or masses of rock. Examination of the plants in flower reveals many slight variations in colour, form and disposition of the flowers, together with more or less mealiness of the foliage and scapes. The plants—or seeds from which they were raised—have come at various times from different sources, and probably many are specimens of geographical forms of the species. *P. limnoica*, Craib, is a rather distinct plant with narrow, downy leaves and lavender flowers. A species with which we have had great success is *P. atrodentata*, W. W. Sm. (fig. 64). Numerous plants were raised from WARD'S seeds collected in 1925, and grown both in pots and in the open. There are several groups of plants in various parts of the garden doing well in peaty soil in light shade. It has the appearance of a small *P. denticulata*, with glossy little rosettes of leaves and dense heads of lavender or lilac white-eyed flowers, pleasantly scented. The scapes at flowering time are from 4 to 8 inches high, but subsequently lengthen considerably.

Farinosae, Pax.—Of this widely distributed section, embracing a large number of species and subspecies, few can be considered permanent in cultivation. *P. rosea*, Royle and its forms are perhaps the most valuable horticulturally. At Wisley they have become established in several spots on the edges of little streams traversing the rock garden and at the foot of moist rocks. In such positions they grow and flower freely. Perhaps the best is the "Brockhurst" variety, a large and brightly coloured form. Of equal charm are the colonies of *P. frondosa*, Janka, planted in the rock garden. One of the most satisfactory of these is on a sloping bank facing north, almost under the branches of an old Rhododendron, in a soil which supplies abundant moisture with adequate drainage. It may be worth noting that this bed is adjacent to that in which *P. Littoniana* has been a great success. *P. involucrata*, Wall. has long been represented in the garden, and more recently its subspecies *P. yargongensis*, Petitm., better known as *P. Wardii*, Balf. f. Plants of this were raised in large numbers from seeds of FORREST'S collecting, and in addition to having been distributed from Wisley have been planted in the garden. For garden purposes it may be described as a rosy- or lilac-flowered *P. involucrata*. It flowers well while still young, and is well adapted to pot cultivation in a cold house, where its fragrance is an additional attraction. *P. tibetica*, Watt, is growing in a moist bed of peaty soil in the wild garden. Its Chinese ally, *P. fasciculata*, Balf. f. et Ward, was obtained from FORREST'S seeds in 1919, and grew very well in the open for several years. We have it still in the alpine house. *P. fasciculata* is similar in most respects to *P. tibetica*, but the larger flowers are carried singly and the petals show less tendency to reflex. Two other

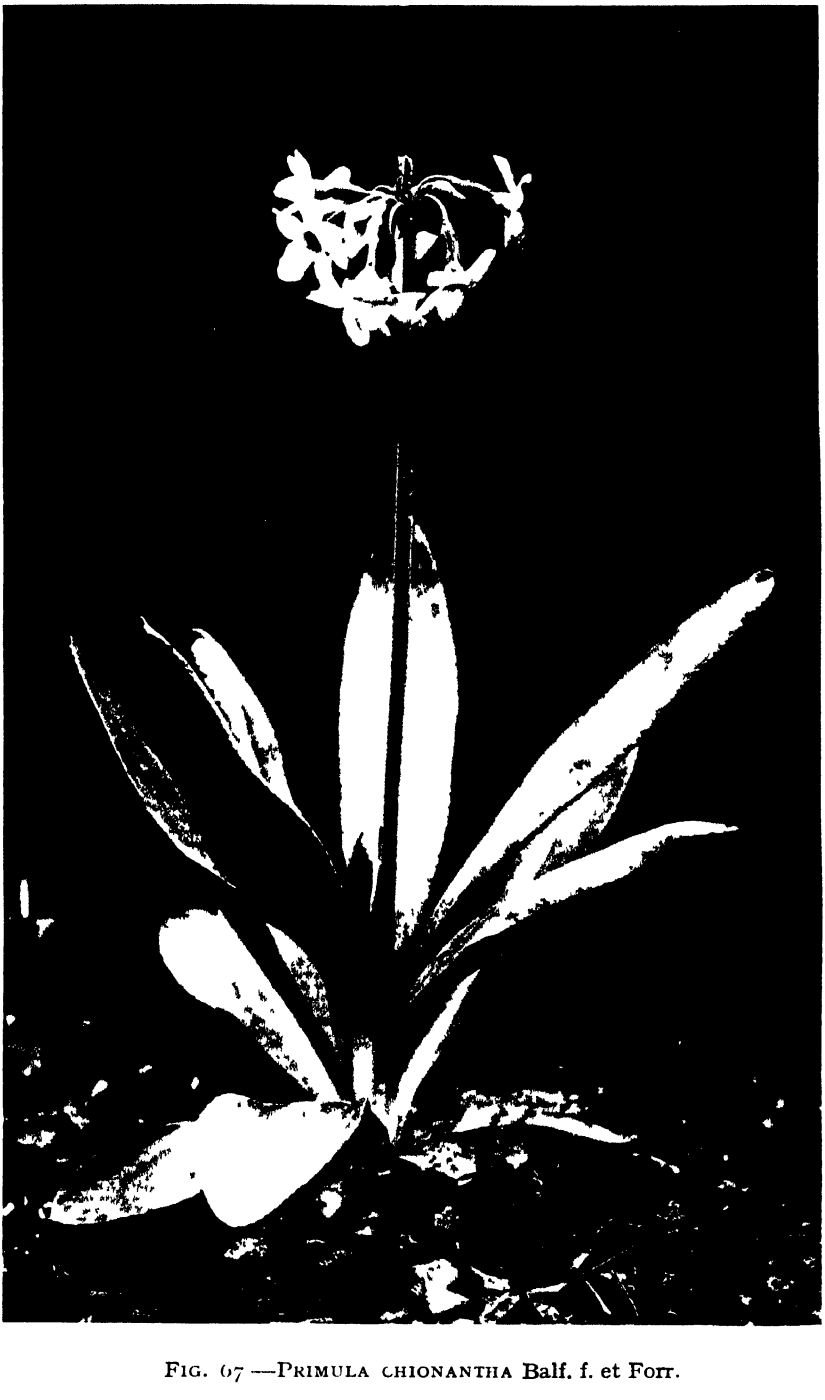


FIG. 67.—PRIMULA CHIONANTHA Balf. f. et Forr.

[*To face p.* 72.

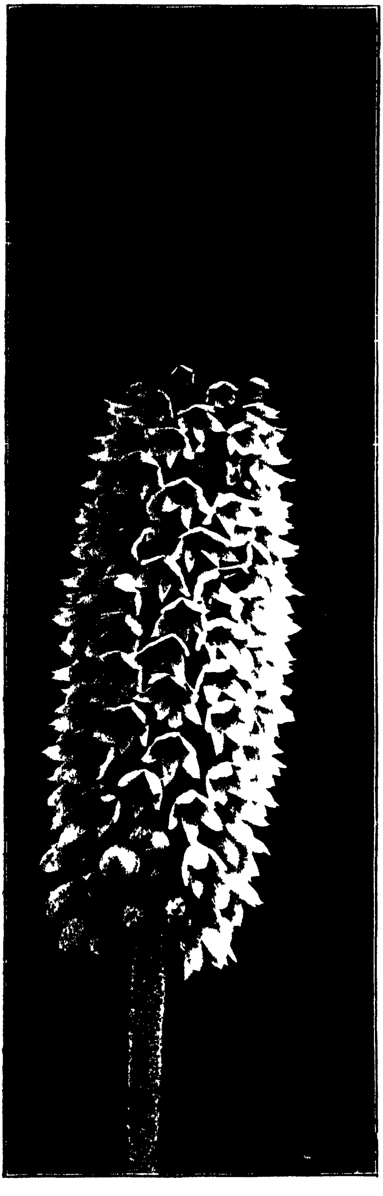


FIG. 68. PRIMULA LITTONIANA Forr.

Fig. 69.—Primula Florindae at Wisley

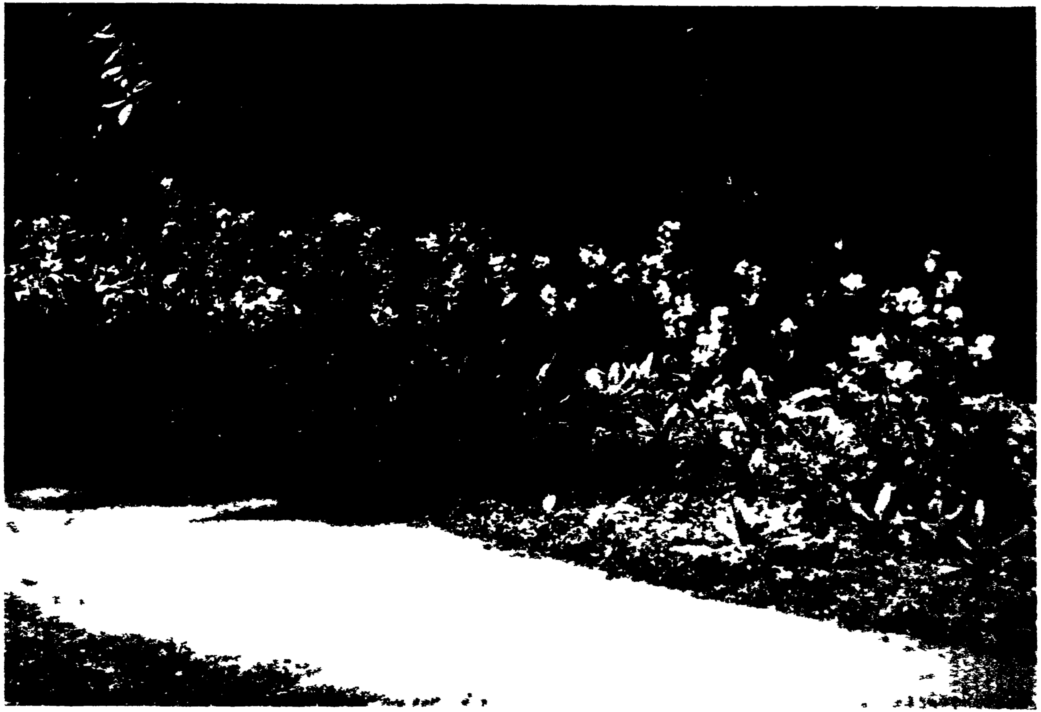


FIG 70 —PRIMULA MICRODONTA VAR ALPICOLA AT WISLEY

To face p 73

members of the section are included in the Wisley collection, namely, *P. Loczii*, Kanitz., and *P. longiflora*, All.

Megaseaefolia, Balf. f.—The Caucasian *P. megaseaefolia*, Boiss., stands alone in its section. It is distinct in appearance and its flowers are very welcome, being among the earliest to appear in the alpine house. This is the best place for it, as it is not satisfactory outside.

Muscarioides, Balf. f.—This section contains some very charming plants, some of which allow themselves to be grown without much coaxing. The individual plants are not of long duration and most of the species are best treated as biennials. *P. Littoniana*, G. Forrest, is the best of all, and is by now well known. For years it has been an object of no little interest to visitors to Wisley. The plants are growing in a slightly raised bed of moist loam, facing north, and partially shaded by shrubs. Last summer this group produced well over one hundred flower-spikes. Most of the plants lived through the trying winter weather and are now starting into growth again. None of the other species has quite the decorative value of *P. Littoniana* and the smaller ones are better adapted to alpine house treatment than to outdoor conditions. *P. atricapilla*, Balf. f. et Cooper, was raised from WARD'S seeds of 1925 and planted out in the wild garden, where several plants are in flower now. Whether this is their first flowering I cannot say with certainty. The collector's field note describes the colour as a "lovely shade of periwinkle blue," and this is an appropriate description. We have also had *P. Giraldiana*, Pax, in flower in the open recently. *P. cernua*, Franch., *P. muscarioides*, Hemsl., and its subspecies *P. conica*, Balf. f. et Forrest, and *P. cyanantha*, Balf. f. et Forrest, were all raised and flowered from FORREST'S seeds in 1918, but have since been lost. *P. apoclita*, Balf. f. et Forrest, has been grown in the alpine house during the last year or two, but it is a poor thing with small, purplish flowers of little value.

Nivales, Pax.—I come now to one of the largest sections of the genus, and one containing some of the most fascinating species. They have, unfortunately, a well-deserved reputation of being difficult in cultivation: they are deep-rooting plants intolerant of wet soil around the crowns in winter. In addition many appear to be monocarpic, at least in this country, and are thus more easily lost. At Wisley a good many have been raised from time to time, but I fear the only one we have at the present time is *P. chionantha*, Balf. f. et Forrest. It grows well in an open place beside one of the rock garden pools. Another delightful species is *P. Purdomii*, Craib, of which I recollect having seen a large number of plants in flower at Wisley about twelve years ago. Its stay in cultivation seems to have been short. A rather more robust species which we have had is *P. melanops*, W. W. Sm. et Ward, collected in Szechuan by WARD. It is somewhat like *P. sinopurpurea*, Balf. f., but rather smaller, and white-farinose on the undersides of its leaves. The flowers are dark purple, with almost black centres. This flowered once or twice, but has since been lost.

Other species of this section which we have kept for a time are *P. pulchella*, Franch., *P. pulchelloides*, Ward, *P. Maximowiczii*, Regel, and its allies *P. szechuanica*, Pax., and *P. tangutica*, Duthie.

Obconica, Balf. f.—The many brightly coloured and large-flowered forms of *P. obconica*, Hance, call for no comment here. Two plants of close affinity which may be mentioned are *P. sinolisteri*, Balf. f., and *P. werringtonensis*, Forrest. Neither of these is hardy, and as they are inferior to the horticultural varieties of *P. obconica* in decorative value, they are not likely to prove serious rivals.

Petiolares, Pax.—This very large and varied section is represented in cultivation by one species only, *P. Winteri*, W. Wats. For fifteen years this has been growing at Wisley in a crevice between two large rocks, where it is shielded from sun and rain, and where its roots always have access to water supplied by a natural spring. In this position it never fails to flower freely in midwinter, and is for a period the brightest plant in the garden. It is also grown in pots for the alpine house, and here its clear lavender flowers and silvery foliage can be seen in perfection. Seed is produced by artificially pollinated flowers, and seedlings have been raised.

Rotundifolia, Balf. f.—Here is a small section represented in cultivation by two species only, *P. cardiophylla*, Balf. f. et W. W. Sm., and *P. Baileyana*, Ward. The latter is a delightful plant with white-farinose leaves and lavender-blue flowers. It was raised at Wisley in 1925 and has flowered twice, but it has never grown freely, and the few small plants we still possess do not show promise of any flower at present.

Sikkimensis, Balf. f.—In contrast to the last section this may be considered one of the easiest and most valuable horticulturally. *P. sikkimensis*, Hook., and *P. pseudosikkimensis*, G. Forrest, have for some years been grown at Wisley, as have also the purple-flowered *P. vittata*, Bur. et Franch., and *P. secundiflora*, Franch. Another yellow-flowered species, *P. microdonta*, Franch. ex Petitm., was introduced to cultivation twenty years ago, but I can find no record of this having been planted at Wisley. Within the last three years, however, two varieties of the species, var. *alpicola*, W. W. Sm., and var. *violacea*, W. W. Sm., have been added to the collection and have become well established. Seeds of both of these varieties, collected by WARD, were sown at Wisley in 1925 and germinated freely. There is no doubt concerning the value of these two varieties. They are good growers, and yield an unusual series of colour forms, from violet to light rosy-purple and from yellow to white. The best place for these is the half-shaded bank of a stream where the soil is always moist. In drier positions the stature is reduced and the leaf-rosette becomes flatter and smaller. Another important find by WARD on the same expedition was *P. Florindae*, Ward. It appreciates a position similar to that recommended for *P. microdonta*. In shady places its flowering period extends well into July. We have one other purple-flowered species, *P. Waltoni*, Watt. It seems to be of less robust habit than *P. micro-*

donta, but thrives in similar situations. Its colour has been justly described as " a deep glossy port wine colour," and is intensely rich in sunlight, but in the half-shaded places where the plant is growing at Wisley its tone is too subdued to be valuable for distant effect.

Soldanelloides, Pax.—This section provides further examples of species which combine extreme beauty with great cultural difficulty. We have had three of them: *P. Reidii*, Duthie, *P. nutans*, Franch., and *P. Cawdoriana*, Ward. *P. nutans* and *P. Reidii* respond satisfactorily to cool house treatment, and *P. nutans* was put out in the rock garden, where it lived and flowered for a couple of seasons in a nook where its crown was protected from winter rains. Unfortunately its life in the open was short. *P. Cawdoriana* has an even more disappointing history. It flowered for the first and only time at Wisley two years ago, and although a few plants survived the winter the stock is now lost.

Vernales, Pax.—I do not propose to discuss the many varieties and hybrids of the Primrose, Cowslip, and Oxlip. These have been adequately dealt with. The only species of the Vernales section that need be mentioned here is *P. Juliae*, Kusnetzow. This deserves the highest praise for its free- and early-flowering habit. Planted beside a pool in the Wisley rock garden it has spread widely, and annually produces an extensive carpet of blossoms.

Mr. MUSGRAVE: Can Mr. GOULD or anyone else tell us anything about the purple form of *P. microdonta*, and especially the red one, as to its position of growing in the garden? My small experience of the matter rather goes to show that the purple form of *P. microdonta* does not do so well, at any rate, in a wet place or where the soil is damp as it does in a dry place. It seems not only to grow better, but to be a stronger plant and show up more stems, but to stick much better in the winter.

With regard to *P. Littoniana*, those planted in a wet place have all disappeared; I have only one left out of a big batch, but in a drier place it survived. Can anybody give us some information as to the cultivation of those two, because I believe they are both good plants which, if we knew exactly how to deal with them, would make really good garden plants?

Mr. GOULD: With regard to *P. Littoniana*, it seems to be, I think I am right in saying, a little less robust than *P. microdonta*. *P. Littoniana* was planted originally on the sides of ditches very near the water, and it grew there. I have not this year had an opportunity of looking for it to see whether it is coming up again; they are rather late starters, but the Microdontas are coming up very strongly. At present they are two or three inches high, actually one or two are in flower.

I cannot say whether *P. Littoniana* is coming up; it is too early to say with certainty. Microdontas, as far as I can see, do not appear to object to water, though they are coming up quite strongly, possibly more strongly in the higher parts; it will be interesting to see what they do this year.

Mr. MULLIGAN: I should like to say I have seen *P. Littoniana* coming up and showing bud. I think it cannot like water; it certainly likes shade, because I have seen it growing in shady places where it did not get superfluous water. May I ask whether there is a summer-flowering form of *P. Winteri*, or is it always confined to the winter?

Mr. GOULD: I do not know whether there is a summer-flowering form.

The CHAIRMAN: Most likely Dr. Stapf would tell us.

Dr. STAPF: I have come to the conclusion that the plant so generally known as *P. Winteri* has long ago been described as *P. Edgeworthii*. In its natural state, as far as I can judge from the fairly ample material which I have had in my hands, and such very meagre reports as I could glean from the notes which collectors give with their specimens, or occasional remarks in literature, it seems that the plant might under natural conditions flower rather early or rather late; it would depend on the locality to a certain extent. The plant has a very peculiar way of developing which I have observed, and I suppose you must have seen the same thing at Wisley. The leaves in the winter disappear and are reduced to what I should call winter bud, and those winter buds are like those I have seen in the Himalayas: they are compact and remain so in the winter, and it depends on conditions under which origination begins in the spring whether they will develop and flower early or late. The conditions here are not quite comparable with those you get in the mountains, where the plant is mostly confined to altitudes of eight to ten thousand feet, and where it would be an April or May flowering plant. That is all I can say. I have only seen it in a few other gardens and not in its native country.

The CHAIRMAN: We must thank Mr. GOULD for this addition to our practical knowledge this afternoon; he has given us the very thing we all want.

CULTIVATION OF SOME NEW AND UNCOMMON PRIMULAS.

By J. ADAMSON.

I DO not by any means profess to have mastered the art of cultivating all the various members of the genus, but I have had practical experience for a good number of years among hardier species under the most varying conditions and an account of these experiences may possibly be of service to others and prevent them from making gross mistakes which I must confess to have frequently committed at different times.

The Primulas have a very wide distribution, and in their native habitats are found growing under various conditions. Our wet winters and dry summers are just the reverse of what the majority are used to in their native homes. I have therefore selected a few species from various sections so that the amateur may get a wider knowledge of the genus and the most suitable position and soil according to my experience.

As the majority of the species in my notes are raised from seed I will briefly explain our methods. We begin sowing early in March in shallow pans or boxes which must be clean and well crocked. A layer of rough leaves is placed over them and the receptacle is then filled to within 1 inch of the rim with a mixture of 2 parts of loam, 1 of leaf soil, and 1 of sand, which has passed through a fine sieve and is thoroughly mixed. We sow thinly and just cover the seeds with fine soil, water gently with a fine rose and place in a greenhouse or frame. The pans are then kept shaded until germination takes place, when more light and air is required.

For some of the larger seeded and free-growing species we sow broadcast in cold frames that are thoroughly drained. A layer of rough leaves is placed over the drainage, then prepared soil to a depth of 6 inches, and made moderately firm. The various species are divided by canes laid on the surface of the soil and gently pressed down. After sowing we cover in the usual way and water thoroughly. The lights are kept closed and shaded until germination takes place. Light and air are admitted gradually. Care must be taken not to overwater, as damping-off is apt to take place. When the seedlings are large enough to handle they are pricked off a few inches apart into boxes or frames and are grown on until large enough to plant into their flowering quarters in late summer so that they get established before winter. Tender sorts are left over until late spring. We make a point of clearing off the decayed foliage before winter, especially of young plants, and give them a coating of coarse sand, this helps to ward off slugs as well as providing protection. It is well to remember all Primulas enjoy ample moisture during the growing season, and on light soils would benefit by a good mulch of rough leaves or lawn mowings during the summer.

We now turn to the various sections, taking first the section—

Bullatae.

All the members of this section have distinct rugose or wrinkled foliage, such as you find in the well-known *P. Forrestii*. *P. Dubernardiana* is a rare species with pale pink flowers collected many years ago by Mr. G. FORREST. Coming as it does from the high limestone cliffs, it resents our wet, changeable winters, especially in the north. It responds, however, to cultivation with a fair amount of success if planted in a good calcareous loam in a retaining wall facing west with a stone projecting overhead, or in a cleft between rocks where it joins up to the soil behind. The chief requirements are to have sufficient moisture at the roots and the foliage kept more or less dry.

P. redolens, native of Yunnan, with pale pink or violet flowers, will grow under the same treatment as *P. Dubernardiana*. The same cultivation applies to *P. rufa*, a yellow-flowered species, which differs only botanically from *P. Forrestii*. It is said to be hardier, but personally I find no difference in that respect. All the species mentioned are raised from seed.

Candelabra.

This section is well represented in gardens to-day by *P. Bulleyana*, *P. pulverulenta*, etc. Generally speaking, we find in it some of the finest and most easily cultivated species and varieties in the whole genus. They are natives of moist valleys or meadows at high elevations, often in full sun or in partial shade by the edge of the forests among Bamboos or dwarf shrubs. They are, therefore, ideal for growing on a lavish scale (with but few exceptions) along the banks of a stream, or by the side of a woodland walk in a good loamy soil containing plenty of humus. In some districts they do equally well in a peaty soil. Some like *P. aurantiaca*, a very rare species, may be tried on the north side of the rock-garden.

The leaves of *P. aurantiaca* are distinct with dark red veins, and the scape reaches nearly 1 foot in height with 2 or 3 whorls of flowers of a lovely orange shade. It thrives in a mixture of 2 parts of loam, 1 of leaf soil, and 1 of sand. It is propagated by division after flowering, by seed which is sparingly produced, or by young plants that often form on the top of the old flower-spike.

P. chungensis from S.E. Tibet, found in meadows in partial shade among trees and bushes, is closely related to the well-known *P. Cockburniana*, but taller. The flowers are of a rich orange and the outside of the tube blood-orange, which makes it attractive, producing 4 or 5 whorls of flowers on 2-feet stems. It enjoys a light rich soil in a well-drained position on the north side of the rock-garden, among ferns or by the side of an open woodland walk where the winter rains drain away quickly. It is easily raised from seed.

Although *P. serratifolia* has been in cultivation for at least twenty years, it is rarely seen outside Botanic gardens. It produces very attractive bicolored flowers, yellow and lemon, in 2 or 3 whorls on 1½ to 2 feet stems. Although perfectly hardy it is not so free a grower as others of this section. It thrives best on a gentle slope in half shade on the west side of the rock-garden in a well-drained position, in 2 parts loam, 1 leaf soil, and 1 sand, with some lime rubble added, and is increased by seed and division after flowering.

P. Smithiana, not so well known as *P. helodoxa* from which it differs only botanically, has golden yellow flowers on 2-feet stems, enjoys a half-shaded position and being evergreen, sheltered from the north and east winds, enjoys a rich soil with plenty of humus added. It is increased by seed.

Capitatae.

All the members of this section produce their flowers in round heads like the well-known Himalayan species *P. capitata*, but differ in a more or less degree in the size of flower and foliage. They are not difficult to cultivate, but in cold northern districts this section is apt to suffer from excessive moisture during the winter as well as from the cold north and east winds in early spring. It is well to bear this in mind in selecting a position in the rock-garden, preferably west, in light, rich soil of loam, leaf soil, and sand. They are usually short-lived plants, but easily raised from seed.

P. crispata, from Sikkim, is a sub-species without meal on the foliage which is much serrated. The flowers are large and of a purple-blue shade.

P. sphaerocephala, native of China, has flowers and flower trusses rounder and smaller than most of the others.

Cortusoides.

All the species and varieties of this section are more or less shade-loving or woodland plants. It includes some well-known plants such as *P. Veitchii*, and many others.

P. geraniifolia, as the name denotes, has palmate hairy foliage, like some of the common Geraniums. It is a native of Sikkim and the Himalayas. The flowers, which are of an old rose shade, are loosely carried on 8-inch stems in June and July. A well-drained position in half-shade on a gentle slope, facing west, in a rich, gritty soil suits it, and it may be raised by seed and division.

P. heucherifolia is a Chinese species very similar to *P. geraniifolia* but with more hairy foliage and earlier flowering, the blossom being a shade darker. It enjoys the same position and soil and is increased by seed and division.

Farinosae.

This is one of the largest and most widely distributed sections in the whole genus, and its species are found scattered over Europe, China, and Japan, and include the typical *P. farinosa*, *P. frondosa*, etc. Many are short-lived plants in our wet and changeable winter climate.

P. capitellata is a dainty species, native of Afghanistan and Persia at very high altitudes. The flowers are rosy-lilac in compact heads on 4 to 6-inch stems powdered with white meal. It is best on a cool slope in the rock-garden where the drainage is perfect, in 2 parts of loam, 1 of leaf soil, and 1 of sand. It is not a long-lived species, but easily raised from seed. It flowers in May.

P. darialica, a native of the Caucasus, best described as a small *frondosa* with lilac flowers on 4-inch stems. The same position and soil are required by it as recommended for *P. capitellata.*

P. conspersa hails from Western Kansu. It is closely related to the well-known *P. chrysopa*. The flowers are lilac with a distinct yellow eye, carried on 1-foot stems. It requires a well-drained position in half-shade on a gentle slope position, in a rich, gritty soil. It is very difficult to keep as it resents our wet winters and must be raised annually from seed.

Denticulata.

I believe *P. denticulata* is the most common species in cultivation and one of the most variable in form and colour. The following Primulas are from the horticulturist's point of view merely sub-species of *P. denticulata*, and are easily cultivated in good loamy soil. In very wet districts a position on a slope suits them best.

P. crispa, a distinct form from Sikkim, has flowers of pale mauve on 8-inch stems in April. Sometimes increased by division but mostly by seed.

P. erythrocarpa, a native of Bhutan, is a splendid addition to this section, with fine heads of pale lavender flowers on 12-inch stems. It prefers half-shade in a good rich soil, and is easily raised from seed.

Muscarioides.

This is a distinct section where the numerous small tubular flowers are almost sessile and usually of a drooping habit, fit closely together, and form a spike which varies according to the different species from 1½ to 10 inches. They are mostly found in open woodland and along the margins of the forests, especially in Western China and Tibet. Although hardy, they are short-lived plants in our wet winter climate. All enjoy a position in half-shade where the drainage is perfect, in a mixture of 2 parts of loam, 1 of leaf soil, and 1 of sand, arranged in irregular groups among low-growing, hardy ferns on the north-west side of the rock-garden.

P. cernua is a charming species, with medium-sized heads of a lovely violet-blue shade, in May, on 9-inch stems. Increased by seed.

P. conica is a sub-species of *P. muscarioides* with rosettes of pale green hairy leaves. The flowers vary from pale blue to milky white, and are very attractive on stems 12 to 18 inches high, in May. It is easily raised from seed.

P. pinnatifida, a Chinese species from the Lichiang range, is one of the most distinct in this group, with deeply cut foliage and light blue flowers on 9-inch stems, in May. It is increased by seed and is very sensitive to wet winters. A handful of coarse sand or ashes placed over the crown for the winter is helpful and wards off slugs as well.

Nivalis.

To this large and important section, which has a very wide distribution, belong some of the finest species in the whole family. Nearly all the species enjoy good fibrous rich loam in a cool, well-drained position. This is essential, as the majority have fleshy necks 1 to 2 inches underground, which are subject to rotting off at the base. Coarse sand placed round each plant when put into their flowering quarters is helpful in checking this evil. A mulch of lawn mowings will help to conserve the moisture during the growing season.

P. melanops is a beautiful Chinese species rarely seen in gardens. It has the typical fleshy leaves coated with white meal on the underside. The flowers, in April and May, are Roman purple with a distinct black eye and are carried in a loose truss on a 9-inch stem. Increase by division after flowering when possible, and by seed.

P. Parryi, an American species which inhabits moist Alpine regions, has leaves of bright green without any meal. The flowers are large and of a rosy-purple shade on 8 to 12-inch stems. It should be planted in a well-drained position in half-shade in a mixture of fibrous loam and leaf soil. Raised by division and seed.

P. Rusbyi is a charming species from the Rocky Mountains, with narrow lanceolate foliage and rosy pink flowers on 6-inch stems. It requires a position sheltered from north and east winds on a gentle slope shaded from the midday sun, and enjoys light rich soil. It is increased mostly by division.

P. sinoplantaginea is a native of China, with narrow foliage powdered with white meal. The scape is also mealy, reaching a height of 1 foot or more, and carries loose heads of purple blue flowers. It will grow in the same position as *Parryi* and is increased by seed.

P. sinopurpurea is a native of China and Tibet. The leaves are fleshy and coated with yellow meal and the flower-stem from 9 to 18 inches carries loose trusses of deep purple, sometimes violet flowers. It is difficult to keep, requires perfect drainage on a slope in half-shade and is raised from seed.

Petiolares.

This is a large section and contains, I understand, some of the most beautiful species in the whole genus, but alas few except *P. Winteri* are in cultivation owing to the seed being shed in a green state and therefore becoming dried out before reaching this country.

P. Winteri, although well-known as a pot plant, is still uncommon growing out of doors. I have found it quite easy to establish in a low retaining wall or shallow cave, planting in spring in blocks of peaty loam in contact with the soil behind so that plenty of moisture can reach the roots, with rock or flat stones projecting overhead to ward off excessive dampness from the crown. For southern gardens a position north or north-west would be ideal. With us it is facing south-east. The flowers are lavender-blue with a white centre, produced in early spring. It is increased by division and seed.

Sikkimensis.

This section is well represented in gardens by some of the older species such as *P. secundiflora*, *P. sikkimensis* and *P. vittata*, all perfectly hardy. The same may be said of the charming species recently introduced by Captain KINGDON WARD from Tibet. Many of them are already well established and proving splendid garden plants.

P. flexilipes is one of the most dainty Primulas of this section with small round serrated leaves and slender scapes about 1 foot high, carrying several pale yellow flowers powdered with meal. It requires a well-drained position in half-shade in light rich soil with plenty of grit round the collar. Increased by seed and division.

P. Florindae, already well-known, requires plenty of room in a moist soil or by a stream in half-shade in fairly heavy soil. It is not generally known that *P. Florindae* is variable in form of leaf and freedom of flowering, and plants require selection to get the best results from seed.

P. microdonta is a charming species with white flowers sometimes faintly coloured violet or sulphur, of graceful habit producing 2 or 3 whorls of flowers on stems 1½ to 2 feet in height. It appears to resent excessive dampness during winter. It is best in a northern border or open woodland, in well-drained rich soil. Increased by seed.

P. microdonta alpicola is a high Alpine form, 15 to 18 inches in height, carrying a single truss on each stem, of pale yellow flowers hanging to one side and dusted with meal in the throat. It is at home in a northern border among shrubs or on the side of a woodland walk, in a mixture of loam, leaf soil, and sand. Easily raised from seed.

P. microdonta violacea is a beautiful form with violet flowers, and purple or wine shades often appear, all thickly coated with meal in the throat. It requires the same treatment as *P. microdonta alpicola*, and is increased by seed.

P. pudibunda is best described as a small distinct form of Sikkimensis, with pale yellow flowers on 9 to 15-inch stems, sweetly scented and extremely hardy. It is a fine plant for a cool position in the rock-garden in a mixture of loam and leaf soil. Raised by seed.

P. prionotes is a sub-species of *P. Waltoni* with very dark maroon-coloured flowers heavily coated with meal inside, produced freely on 15-inch stems. Although not so attractive as others in this section it may be useful for hybridizing. It varies in size of flower and plants ought to be selected for seed. It has the same requirements as *P. microdonta violacea.*

P. Waltoni is one of the finest Primulas in cultivation, of a ruby or port wine shade dusted with meal inside, on 18-inch stems. In the north it resents excessive moisture during the winter. The drainage must be perfect in a northern border among shrubs or similar position, in 2 parts of loam, 1 of leaf soil, and 1 of sand. It requires ample moisture during the growing season like all the other members. A mulch of lawn mowings we find useful to conserve moisture. Raised by seed.

Soldanelloideae

Few members of the charming Soldanella-flowered primroses are suitable for outdoor cultivation in our wet winter climate, being used to a snow covering for several months during winter in their native habitat, which keeps them dry until the growing season comes round again.

P. nutans can be managed with difficulty. It is a native of Yunnan, a beautiful plant, with soft hairy foliage and large drooping lavender-blue flowers in loose heads on 9-inch stems thickly coated with meal. It requires a well-drained position in half-shade in a light rich soil of loam, leaf soil, and sand on a gentle slope in a shrub border or a cool sheltered spot in the rock-garden. It requires ample moisture during the growing season. A handful of sharp sand placed over each crown for the winter helps to ward off slugs as well as damp. Increased by seed.

INHERITANCE IN *PRIMULA SINENSIS*.

By DOROTHEA DE WINTON, Student, John Innes Horticultural Institution.

PRIMULA SINENSIS has never been found growing wild. The R.H.S. received a drawing of it from Canton in 1819, but the plant sent over died, and seeds failed to germinate. Shortly after, a plant was successfully brought over by Captain RAWES from a garden at Canton. In 1826 seed was brought from China by Mr. POTTS, a collector of the R.H.S., but no new variety seems to have come from it.

Coming as it did from gardens at Canton, we cannot say if it is a pure species or a hybrid, but from the large number of variations it has produced, it is most probably a hybrid. It will not, however, cross with any other known species of Primula, and it is perfectly self-fertile. For some years *P. calciphila* was looked on as the wild *sinensis*, but to anyone familiar with *sinensis* it is evident that they are distinct; and further, they will not cross. In 1923 the mistake was righted and the name *calciphila* given to the new species.

Our experiments with the genetics of *P. sinensis* were started by Mr. BATESON in 1903, carried on by him and Mr. GREGORY till the latter's death in 1918, since when all the work has been done at Merton, and under the direction of Mr. BATESON till his death in 1926.

We work with twenty-four pairs of factors, each pair being inherited according to Mendel's law. These factors relate to the forms of the leaf and the corolla, the anthocyanin colours and their distribution in the leaves and stem as well as in the petals and stigma, the extent of the yellow pigment in the eye, the length of the stigma, single and double flowers, as well as various structural modifications. All these differences have appeared as mutations, turning up unexpectedly in pure strains from time to time and breeding true. From coloured plates which appeared in 1821 in the "Botanical Register" and LINDLEY'S "Collectanea Botanica" we know that the original plant had all the dominant factors we work with to-day except two that are known to have appeared since.

Habit.—In habit the original plant was *sinensis*—that is, compact, the flowers having fringed, overlapping petals and at least ten calyx teeth. The excessive number of calyx teeth made LINDLEY doubt whether it was right to classify it as a Primula. In 1825 a coloured plate of the *stellata* variety was published in "Exotic Flora." This variety, for which the original plant must have been heterozygous, has a tiering habit and star-shaped flowers, each with a single notch in the centre of the petal. The calyx teeth are five, the normal number for a Primula. *Sinensis* is an incomplete dominant to *stellata*, the hybrid being the form known as *pyramidalis* with the tiering habit of *stellata*, but the flower shape and the number of calyx teeth of *sinensis*.

All known varieties can be grown as *sinensis* or *stellata*.

Stigma and Stem Colour.—In the original plant the stigma and ovary were green, *i.e.* carried the factor G; in the absence of this factor the gynaecium is coloured, usually red. Several other factors are affected by G; a plant with fully coloured stems and leaves can only have a pure white flower if the stigma is green. With a red stigma there is always a deep flush of colour round the eye. The well-known variety 'Duchess' is a good example of this.

The depth of flower colour is largely dependent on stigma colour. It is impossible to have a pink flower with a red stigma or a really dark red with a green stigma. The same is true of blue flowers. The only genetic difference between the varieties 'Czar' (dark blue) and 'Reading Blue' (pale blue) is that in 'Czar' the stigma is coloured and in 'Reading Blue' it is green.

This, of course, is only true when the stem and leaves are fully coloured.

The variety 'Coral Pink' is a seeming contradiction to this rule, having pale-coloured flowers with a red stigma, but its genetic constitution is quite different from that of ordinary reds and pinks. Its pale colour is due to a recessive inhibitor of colour, and it is possible to breed corals which are carrying the factor for red or blue or both or neither. They will all look alike.

With a green stigma coral is very pale. It originated as a sport from the well-known variety 'Crimson King,' which had bred true for many years.

Flower colour also depends on the colour of the stem and leaves.

The original plant had reddish stems and leaf backs; it possessed the dominant factor L. In the absence of L the leaves and stem are of a deep claret red. There are two kinds of green stems and leaves—one with no colour anywhere which, when crossed to a normal coloured plant, gives an intermediate F_1; and one with very slight colour in the young leaves and petioles, which is a complete recessive to the normal. It is impossible to have fully coloured flowers on plants with less colour than normal in their leaves and stems, even if they have coloured stigmas. The dark claret-coloured stems and leaves have no effect on magenta or red flowers; pale pink and pale magenta are quite compatible with them as long as the stigma is green. Blue, on the other hand, is quite incompatible with a dark stem; all such plants have flowers which are mottled except for a dark band round the eye.

Flower Colour.—The original plant had the two dominant factors for flower colour, B and R, and was therefore magenta. B was the first to drop out, causing red flowers. When R was lost, blue flowers appeared. From crossing blue and red, magenta is made, and in the F_2 of such a cross a fourth colour appears, having neither B nor R.

This variety we call slaty: it is nearer a blue to look at, but to a trained eye easily distinguishable. It, of course, breeds true and, crossed with red, gives a red F_1, whereas a real blue crossed with red gives magenta. When combined with the dark claret leaves and stems it gives the same mottled flowers as blue. Examined microscopically, it is seen to be quite distinct. In a blue flower the anthocyanin in the epidermis of the petals is in solution, whereas in "slaty" most of the cells of the epidermis contain anthocyanin in solid form.

A plant lacking the factor for colour is an albino with pure white flowers and green leaves. Such a plant crossed with a colour gives a coloured F_1, and in F_2 three coloured plants to one white. A plant carrying the dominant inhibitor of colour has pure white flowers with coloured stems and leaves. Such a plant crossed with a colour gives a white or tinged white F_1, and in F_2 three whites to one coloured. As already stated, these dominant white plants can only be pure white if the stigma is green; with a coloured stigma they always have a flush round the eye. Also if a dominant white, red stigma, is crossed with a colour the F_1 will have pale strawberry-coloured flowers. This is a hybrid colour and will not breed true, but gives one flushed white and one colour to two like itself. If it is wanted to produce plants of this colour, of which the variety 'Sir Redvers Buller' is an example, a red and a white plant, both with red stigmas, must be crossed every year.

Whilst I am on the subject of flower colour I should like to correct a mistake about the effect of heat on *sinensis* flowers. There is a statement in many text-books that it is possible to change their colour from red to white by growing them in great heat. The truth is that tinged white, and plants with pink flowers and an intermediate stem colour, are very susceptible to changes of temperature. Kept hot the white plant will show no sign of colour and the pink will be very pale, whereas the same plants put into a cool house will soon become definitely tinged and a very deep pink respectively.

A fully coloured plant with dark red flowers, such as 'Etna,' must have a cool temperature to develop its full colour. Put into stove heat the flowers become poor and often deformed, with a whitish band round the eye, but the colour of the petals is still red. A plant of 'Etna' put into a greenhouse with an average temperature of 65° F. on February 2 had a few flowers still out on May 21; these were fully red, and very slightly paler than a sister plant which had been in a cool house all the time.

Leaf Shape.—Five well-defined leaf shapes are known in *P. sinensis*, the original plant having the dominant palm-shaped leaf. The first mutation was fern leaf; crimp, oak, and tongue or ivy have appeared since. The inheritance of these leaf shapes is perfectly simple and straightforward, and they provide ideal material for demonstrating Mendel's two laws.

Each is a complete recessive to the normal, no intermediates ever appearing. Any two crossed together give a normal palm in F_1, and in F_2 a simple dihybrid ratio of nine palm, three of one parent, three of the other, and one a combination of both.

The size and shape of the corolla and eye depend, to a large extent, on leaf shape. If a perfectly normal flower is wanted it is better to keep to plants with palm leaves. A fern leaf has very little effect on the flower, only producing an eye of a slightly different shape. With oak leaf *stellata* flowers are perfectly compatible, but *sinensis* flowers, unless they are double, are apt to have petals more spaced out, and in all respects, except calyx teeth, to be nearer *stellata* or else deformed. With tongue or ivy leaf the petals are elongated and narrowing towards the periphery. *Sinensis* plants with this shaped leaf always have five or six calyx teeth instead of ten, the usual number; *stellata* tongue has five as usual.

The crimped leaf has the most marked effect on the flower shape and colour, and also on the eye. Two varieties of crimp are known, one being less crimped than the other. The most crimped form turned up in 1913 in the vinery of a private garden at Egham and has since bred true. Having fringed petals it was supposed to be *sinensis* and the colour pale mauve. From breeding it has proved to be *stellata* and pink. When the crimped leaf is combined with *sinensis* flowers the crimping is far greater and tends to increase as the plant grows older. The flower is very large in most cases and falls very easily; the number of calyx teeth is also greatly increased.

Eye Shape and Style Length.—The normal eye of *P. sinensis* occupies a small area round the mouth of the corolla tube and varies somewhat in shape. The colour is yellow, but it sometimes has a green tinge, and with a coloured stigma is much darker and browner and often has a dark blotch on the outer edge.

All plants with crimped leaves have the eye much enlarged and the edge is blurred instead of being clearly defined. This is quite distinct from the larger yellow eye, characteristic of the varieties 'Primrose Queen' and 'Eynesford Yellow,' which is always associated with the homostyle condition.

Short style is dominant to long, and the illegitimate crosses short by short and long by long are nearly as fertile as the legitimate short by long and reciprocal. In fact, in this country all commercial varieties of *P. sinensis* have to be long-styled. The homostyle condition breeds as a long style and is inseparable from the large eye. Short style is in no way altered by this large eye, which is a simple recessive to the normal eye.

When crimped leaf is combined with large yellow eye the flowers are very small, consisting almost entirely of 'eye,' and they drop very easily. In 1902 MM. VILMORIN of Paris introduced the variety with a white eye which proves to be a dominant to both the other eye forms. It is not completely dominant, the hybrid having faint yellow lines near the tube. These three eyes form a series of multiple allelomorphs—that is, from crossing any two pure strains of eyes together it is impossible to obtain the third.

The factor for this white eye and the factor for the dominant white flower colour are the only two dominants that have been added to the genetic constitution of *P. sinensis* since its introduction into this country. All other mutations have been by loss.

Double Flowers.—Two kinds of doubling are known, the most common having a supernumerary segment inserted at the mouth of the corolla tube opposite each petal. These segments are reversed, the external side resembling the upper surface of the petal. The anthers and stigma are normal except that the anthers are attached in the thrum position whether the style is long or short.

Single is an incomplete dominant to this kind of doubling, the F_1 plants generally showing at least an extra petal.

The old-fashioned double is far more completely double, having an indefinite number of petals not reversed, no stamens, and in most cases a stigma that is split open, exposing the ovules. This plant can never be used as a male, but *very* occasionally a flower has had a normal stigma and ovary and so can be used as a female. From such a cross made by the late Mr. ALLARD the variety 'Harlequin' was obtained. In it one, two, or sometimes three petals, are fully coloured, the remainder being much paler. This is a perfectly constant variety breeding quite true and it can be had in any colour, but to have it fully developed it should be combined with a coloured stigma.

Flaking.—Flaked *P. sinensis* has been known for many years; the flaking can be coarse or sparse, the most usual type consisting of very fine specks of colour, most intense round the outer edge of the petal and sometimes so numerous as to look like a solid band of colour. These fine specks diminish towards the centre of the flower. Large splashes of colour may be superimposed anywhere on the flower, varying in size but sometimes covering the whole of one, two, or even three petals. Crossed to a plant with whole-coloured flowers, flaking behaves as a normal recessive disappearing in F_1 and in F_2 reappearing as a quarter. But it is possible for a flaked plant occasionally to give one that is whole-coloured. Up to the present these whole-coloured plants have all been heterozygous; we have never had a pure breeding, whole-coloured plant coming from a flake.

Leafy Calyx.—A variety in which the calyx is very much enlarged has only been used in our experiments during the last few years, but it has been in existence for much longer. It breeds true and is recessive. We have combined it with most of our other characters and it is inherited independently of them all.

Other Mutations.—Our most recent mutations include a form in which the eye is enlarged and greenish, and the petals very much fringed in *sinensis* and quilled in *stellata*; also a form in which the whole growth of the plant is stunted, the leaves often scorched at the edge; and the petals deformed: this is perfectly fertile and breeds true, but we have only had F_1s from it as yet. This year two fasciated plants appeared in an F_2, but we cannot tell yet if fasciation will prove to be a Mendelian factor, as in *Pisum sativum.*

All these varieties are diploid, having twelve pairs of chromosomes. Two linkage groups have been known for some years and we now have evidence of several more. The most important linkage from a horticultural point of view is that between stigma colour and the factor for the dark claret-coloured leaf and stem. For years it was noticed that all plants with red stigmas had the normal-coloured leaf, whereas the darker-leaved plants invariably had green stigmas. We now know that in an F_2 of the constitution Gl × gL, which were the only plants then available, only one gl plant (red stigma, claret leaves) is expected in 6500. Mr. GREGORY was able in one case to recognize plants that were red stigma, light-coloured stem which he thought were heterozygous for the dark stem. On selfing them he found it was so, and a quarter of the family had the new combination of red stigma and dark red leaves, and of course bred true. This was in 1916. Plants were given to Messrs. SUTTON, who improved the red flower colour and named it 'Etna.' It received an Award of Merit in 1921.

Tetraploids.—From the diploid race of *Primula sinensis* has arisen the tetraploid or giant race, having the double number of chromosomes, *i.e.* twenty-four pairs. It has arisen three times in our experiments, several times at Messrs SUTTON'S, and doubtless elsewhere as well. The true tetraploid will only cross with the diploid with very great difficulty; from several hundred crosses we have only raised three plants, all of which have been completely self-sterile. There is a race of large-flowered *P. sinensis* which are not tetraploid; these, of course, cross freely with ordinary varieties. We have not so many varieties in the tetraploids as in the diploids and they are more sterile. Their genetics are far more complicated than those of the diploids. Each plant, having a double dose of a character from each parent, gives heterozygous plants that are carrying one dose of the dominant to three of the recessive, two dominant to two recessive, or three dominant to one recessive. For this reason flower colour is not so straightforward as in diploids; *sinensis* and *stellata* are difficult to distinguish accurately, and palm leaf heterozygous in fern is an intermediate. The last diploid to mutate to a tetraploid was the variety 'Primrose Queen' with the large yellow eye which is always correlated with the homostyle condition. It is interesting to note that in diploids the heterozygote between normal eye and large yellow eye is indistinguishable from normal eye, but that in giants this is not so. Whereas two doses of normal and two doses of large eye give a normal eye to look at, one dose normal to three doses of large eye will give plants still with normal eyes, but very often the stigma will be in the homostyle position and have the pointed top characteristic of most homostyles.

In conclusion, I should like to ask any grower of *P. sinensis* if he will kindly let us have any new sport that turns up in his plants and is useless to him. These sports are not often valuable from a horticultural point of view but may be very interesting genetically. We should be most grateful for them.

[The paper was illustrated by coloured plates kindly lent by Mr. LEONARD SUTTON.]

The CHAIRMAN : I am sure you will all agree with me in feeling that we ought to congratulate Miss DE WINTON on her very lucid and exhaustive demonstration of inheritance in *P. sinensis*. If it occurs to anybody to ask any question or make any comment before I announce the next item, now is their opportunity.

Professor WEISS : I should like to express my admiration of the way in which Miss DE WINTON is carrying on the experiments of Dr. GREGORY and Dr. BATESON, and I hope the Institute will be able to carry these on to a very successful issue at the end.

Mr. SUTTON : I should like to say how much the growers of *P. sinensis* appreciate the work of Professor BATESON and Miss DE WINTON. Professor BATESON used to say how much he was indebted to those growers like ourselves who gave him an opportunity of studying their work, but I am sure the debt we owe to Professor BATESON and Miss DE WINTON is much greater, because the results shown in the records of the *P. sinensis* crosses have been useful in many other ways. I only wish Professor BATESON could have come to us about ten or fifteen years earlier, because we should have had still longer records ; there are many things I can remember we have lost and not yet got back, but the work done has been most valuable. I do not think there is anything one can criticize in Miss DE WINTON'S paper. She has referred to what has been vaguely in our minds as breeders and growers, and we now understand and can pass it on to other subjects ; it must be, in the future, of very great value.

The CHAIRMAN : In asking you to express your thanks to Miss DE WINTON, I would just like, myself, to add to that last request that she made, that those who do come across anything in their work that is interesting will communicate it. Even if things are not interesting from the horticultural point of view, the Merton people may consider them very valuable from the scientific point of view and be very glad to investigate further.

PRIMULA × KEWENSIS AND ITS DERIVATIVES.

By the late W. C. F. NEWTON and CAROLINE PELLEW,
John Innes Horticultural Institution.

THE hybrid *Primula × kewensis* first appeared as a natural hybrid, raised from seed of *floribunda*, at Kew in 1900. The plant was at once suspected of being a hybrid of *floribunda* and *verticillata*, as these species were at that time grown together in the greenhouses. This origin was confirmed by Mr. COUTTS, who made the cross and succeeded in raising the hybrid again. Since that date the cross has been made many times, both at Kew and at the John Innes Horticultural Institution, but in no case has the original hybrid been produced, although occasionally fertile seed has been obtained from which plants resembling the seed parent have been raised. Such "maternal hybrids," as they were called, are now believed to originate "apomictically," i.e. from unfertilized ovules, in which no reduction division has taken place.

The original hybrids were found to be sterile until, in 1905, a single fertile inflorescence was noticed at the nursery of Messrs. VEITCH. From the seed of this inflorescence was raised the giant fertile form now generally known as *P. × kewensis*.

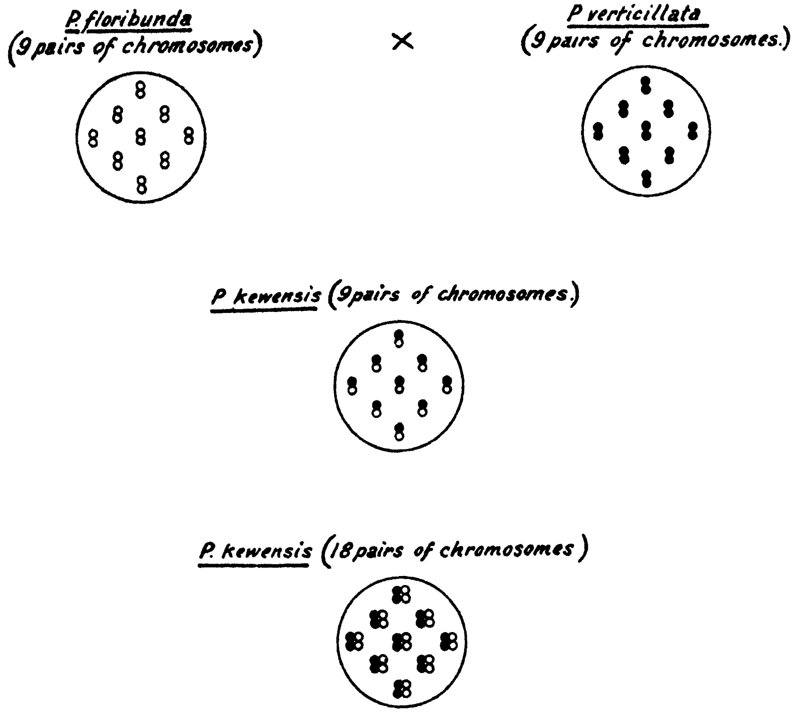
The appearance of this fertile form roused much interest, not only because it was fertile, whereas the original hybrid was sterile, but also because it was almost true-breeding, variations from the type being rare. At that time the discovery by MENDEL that hybrid plants exhibited the phenomenon of segregation, as shown by their mixed progeny, was attracting general attention. Here, however, was a hybrid which bred approximately true, and the question arose whether there existed a fundamental distinction between the hybrids of varieties, with which MENDEL had worked, and the hybrids of species, such as *kewensis* undoubtedly was. It was in the hope of finding an explanation of the peculiar features of the new hybrid form that Miss DIGBY investigated the cytology of the two hybrids and of the parent species. She found a most interesting difference between the cells of the fertile and the sterile *kewensis*. Whereas in the sterile form the number of chromosomes is the same as in the parent species, viz. 18, the fertile hybrid has double that number, viz. 36. But at the time this observation was made, it did not appear to throw any light on the problems either of the fertility or of the constancy of the giant hybrid, for we knew of other instances—for example, the giant form of *Primula sinensis*—of chromosome doubling, but in these cases Mendelian segregation occurred as in the normal plants, the only difference being in the numerical ratios of the various types resulting from segregation and fertilization. The solution of the problem was not found until 1917, when WINGE, the Danish geneticist, brought forward an interpretation of the whole story which has since proved to be right in its essential features.

This interpretation will be more easily explained if we first consider the process of cell division, and especially that which precedes the formation of the gametes, *i.e.* the ovules and pollen grains.

In the course of every cell division by which ordinary growth is effected, a certain number of darkly staining bodies (the chromosomes) is formed in the nucleus, the number being the same in every cell of the individual plant (or animal). In cell division each chromosome splits into two, the halves being distributed equally to the two daughter cells. In the cell divisions prior to the formation of the gametes, *i.e.* ovules and pollen, the process is essentially different, for the chromosomes do not split into two equal halves, but unite or conjugate in pairs, the members of each pair being distributed to the daughter-cells, which therefore contain half the number borne by the parent cell. Each gamete resulting from such a division contains the half number, and not until male and female gametes are united in fertilization is the full (parental) number restored. This peculiar process of division by which the number of chromosomes in the cell is halved is called the reduction division. The members of each pair of conjugating chromosomes are derived originally from the male and female parents respectively, and it is during this association in pairs that interchange between chromosomes and recombination of parental characters is believed to be effected.

WINGE'S theory, by which he explains the fertility and constancy of the giant *kewensis* with 36 chromosomes, rests on the assumption that in it a set of *floribunda* chromosomes (9) and also of *verticillata* chromosomes (9) are duplicated, and that in the conjugation of chromosomes which precedes the formation of gametes, each member of a *floribunda* set pairs with its duplicate, and similarly each member of a *verticillata* set, with the result that no opportunity for interchange occurs between unlike (*verticillata* and *floribunda*) chromosomes. (*See* Scheme, p. 93.) The members of each pair of *floribunda* and of *verticillata* chromosomes separate and pass to the daughter cells, each of which in consequence has both (9) *floribunda* chromosomes and (9) *verticillata* chromosomes. On self-fertilization, the total number of thirty-six chromosomes is again restored, the plant so produced being what is called "tetraploid," *i.e.* it has four times the gametic number of chromosomes of the original parents.

Within recent years it has become known that conjugation of the chromosomes often fails to take place in species hybrids, owing, it appears, to a lack of affinity or perhaps to a positive repulsion between the members of each pair. Such irregularity may lead to partial or complete sterility of the hybrid. But in *kewensis*, as Miss Digby found, no such irregularity is observed, either in the diploid sterile or in the tetraploid fertile forms. We have therefore no visible explanation of the sterility of the diploid form, inasmuch as the nuclear divisions are regular. But in the later stages the regularity does not persist, for large numbers though not all of the pollen grains become disorganized and cease to develope at various stages. For these reasons we are inclined to believe that the sterility of the diploid hybrid is primarily the result of interchange between *verticillata* and *floribunda* chromosomes, the differences between these species being so great that very few of the resulting recombinations are viable, either in the gametic stage or after fertilization.


P. floribunda (9 pairs of chromosomes)
×
P. verticillata (9 pairs of chromosomes.)
P. kewensis (9 pairs of chromosomes.)
P. kewensis (18 pairs of chromosomes)

Scheme illustrating the chromosome constitution of the two forms of P. kewensis.

The question will be asked, How does the sterile hybrid double its chromosomes ? At the John Innes Horticultural Institution in recent years the sterile hybrid has produced fertile inflorescences on two occasions. In one of these the number of chromosomes in the cells of the floral bracts were counted, and were found to number thirty-six. We may therefore conclude that the doubling occurs in one of the ordinary cell divisions of the plant, probably as a consequence of an arrested cell-division. Although we cannot hope to see the process of doubling in this particular case, it has actually been observed in the reduction divisions of certain plant hybrids (e.g. *Digitalis ambigua* × *purpurea* B. H. Buxton and W. C. F. Newton). In these cases it appears that a partial division of the nucleus takes place (the chromosomes splitting longitudinally) followed by the re-formation of a single nucleus within the original cell-wall. In the *Digitalis* hybrid, as in *P. kewensis*, the doubling of the number of chromosomes is associated with the production of fertile plants. An even more striking example of a sterile diploid hybrid giving rise to fertile tetraploid plants is that of the generic hybrid *Brassica* × *Raphanus* (Karpechenko).

The fertility and relative constancy of the tetraploid hybrid is explained by the theory of Winge, but it remains to consider the origin of such variability as is observed among these plants. We have found a few aberrant forms among the tetraploids which have either lost or gained a chromosome; instead of thirty-six they have thirty-five or thirty-seven chromosomes. But similar aberrant plants may occur with thirty-six chromosomes, and in addition, one, a fully mealy form, is found always to have this number. In view of these facts and of other experimental evidence which it is impossible to describe here, we suggest that the variability of the tetraploid *kewensis* is due to an occasional conjugation between *floribunda* and *verticillata* chromosomes, as a consequence of which interchange between chromosomes bearing different potentialities is made possible.

PRIMULA JULIAE AND ITS HYBRIDS WITH THE PRIMROSE AND THE OXLIP.

By C. LEONARD HUSKINS, Ph.D., M.Sc., John Innes
Horticultural Institution.

THE work to be described was begun at the John Innes Horticultural Institution by Miss PELLEW in 1919, and was taken over in 1922 by Dr. R. J. CHITTENDEN, who carried it on until his departure for the Malay States in 1927. An account by Dr. CHITTENDEN of the results up to last spring has just appeared in the *Journal of Genetics*.* This paper is a résumé of those results together with a few observations made this spring on some hybrid progenies which had not flowered before his departure. It is the hybrids between *P. Juliae* and the primrose, *P. acaulis*, or the oxlip, *P. elatior*, which have received most attention, but some results are available from other hybrids within the Vernales section.

The first observation of interest is that in all cases the fertility of the first generation interspecific hybrids was quite high. In view of the distinctive appearance and geographic distribution of *P. Juliae* this seems somewhat surprising. Microscopical examinations of the pollen showed from 50 to 70 per cent. of the grains apparently capable of functioning. Cytological studies of *P. Juliae*, *P. acaulis*, the hybrids *acaulis* × *Juliae*, *elatior* × *Juliae*, *officinalis* × *Juliae*, and Polyanthus Cloth of Gold × *Juliae* showed the chromosome number to be 22 in each case, and where the reduction-divisions of the pollen-mother-cells were studied they were found to be surprisingly regular for interspecific hybrids. Any irregularities that were found were the exception.

The size of the hybrid families in which *P. Juliae* was involved was limited, however, by irregular or delayed germination, which occurs also in selfed seed of pure *P. Juliae*. With either pure *P. Juliae* or any of its hybrid descendants, it was found that some of the seeds would germinate almost at once, while others would lie dormant in the seed pans for any period up to several years.

A number of different crosses were made each way between the primrose and *P. Juliae*, and in each case the first generation bore coloured flowers, though there were two shades of colour. In other respects the plants were comparatively uniform. In habit of growth, shape of leaves, size and shape of flower, and colour and size of eye, the first generation resembles the primrose more than *P. Juliae*. It resembles *P. Juliae* in being semi-glabrous and in its distribution of anthocyanin and its general foliage colour. It flowers before either of the parents.

---

* Journ. Genetics, 19 (3): 286–314, 1928.

The segregation of pin and thrum style was found to be sharp in all the generations raised, though minor differences occur in the length of the long or pin style. The thrum or short style is dominant to pin and the segregation appears to be due to a single Mendelian factor. It may be noted that in those species crosses involving *P. Juliae*, little significant difference was found in the number of seeds obtained from "legitimate" or "illegitimate" matings, and after the first few years crosses were generally made without regard to length of style of the parents.

The inheritance of flower colour was found to be rather complex. In the second generation at least six shades of anthocyanin or magenta colour were noted, but they could not be scored accurately owing to the large degree of fluctuation which occurs. All the anthocyanin colours were therefore grouped together and only the segregation with respect to the three classes, anthocyanin coloured, yellow and white, was considered. With the exception of some progenies from one plant of Juliae, the second generation and back-cross progenies gave ratios for colour which agree fairly well with those to be expected if the primrose carries one factor for yellow colour, and *P. Juliae* carries both an anthocyanin colour factor and a colour intensifying factor.

The inheritance of hairiness is fairly complex. In the first generation the plants are semi-glabrous as in *P. Juliae*. In the second generation and back-cross families the degree of hairiness was scored by the appearance of the pedicel. The observed numbers are fitted fairly well by the assumption that the primrose contributes two factors for hairiness, and *P. Juliae* one factor which inhibits hairiness. The suppression of hairiness appears to be more or less complete when the primrose factors for hairs are present in the single dose or heterozygous condition, as in the first generation, but only partially so when either of these factors is present in the double dose or homozygous condition.

The foregoing three characters, length of style, colour of flower, and degree of hairiness, were the only ones which it was possible to score and analyse accurately, but notes were made on a number of other characters.

The eye of the flower is yellow in both Juliae and the primrose, and no segregation of eye colour was noted in the crosses between them. Both species normally have solitary flowers, but pure primrose plants may occasionally produce pedunculate or polyanthus type inflorescences, and this was found to occur also in these hybrid progenies.

The eye shape was, rather surprisingly, found very difficult to score. At first glance the eye shape of the two species is very different, the points of the eye occurring at the junction of the petals in *P. Juliae* and at the middle of the petals in the primrose. But in young primrose flowers a trace or ghost of the Juliae eye shape occasionally appears, and there is likewise a ghost of the primrose eye in *P. Juliae*.

Practically a complete series of intergrading forms was found to occur with such characters as leaf shape and size, length of pedicel, and amount of anthocyanin in the vegetative parts.

Several characters which were not present in either parent, such as petals with a frilled margin and without an apical notch as in *P. sinensis*, and other types with petals not noticeably frilled, yet without an apical notch, as well as plants with extremely narrow petals appeared in the second generation and back-cross families. A few types of possible horticultural interest appeared, and these are now being multiplied for showing next year.

Certain groups of characters were found in general to be strongly associated or dissociated. For instance, the deeper flower colour and the Juliae eye shape rarely if ever occurred on a plant with leaves of the primrose type. Dr. CHITTENDEN suggests that this may be explained on the basis that many factors, probably located in many different chromosomes, are required to produce the primrose leaf type, and a plant which has this leaf type is therefore predominantly primrose in its chromosome constitution. He considers that similar arguments may be used to explain the observations that the deeper flower colours occur most frequently on plants with small leaves and flowers, and that the Juliae eye shape is usually found on a small flower.

A repulsion between deep flower colour and the hairy or very hairy condition is suggested, he says, by his observations that both the deep flower colour and the Juliae eye shape are almost invariably associated with the semi-glabrous condition characteristic of Juliae. While this has not yet been proved, there is some evidence that the yellow factor of the primrose is genetically linked with the factor for hairiness.

Finally, he notes that the Juliae eye shape has never been seen on a white or yellow flower, though it may occur on either a pale or a dark coloured one. His explanation of this is that the presence of anthocyanin is probably necessary to mask part of the primrose eye and thus produce one of the Juliae shape.

The results from crosses between *P. Juliae* and the true or Bardfield oxlip, *P. elatior*, in general were similar to those from Juliae × primrose crosses. The first generation plants were more or less similar to the oxlip in habit, amount of anthocyanin in the vegetative parts, colour and shape of eye, and pedunculate or polyanthus character of the inflorescence. The inflorescence, however, was either drooping or erect, and not one-sided, whereas in the oxlip it is drooping and one-sided. Usually the flower was yellow, similar to that of the oxlip, but with a tinge of colour under certain cultural conditions. Some plants of *P. elatior*, however, gave yellow-flowered and anthocyanin-coloured first generation progeny in approximately equal proportions when crossed with Juliae. The leaves in general were more or less intermediate in shape between those of the parents. All the plants were semi-glabrous like *P. Juliae*, and the flower size was also similar to that of Juliae. The time of flowering was before that of either parent. Excepting for colour of the flowers, all first generation plants of this cross, made either way, were similar.

In all the generations raised the thrum style was again found to be dominant to pin. The numbers agree very closely with the ratio expected from a single factor difference.

In the second generation and back-cross families the inheritance of flower colour was again found to be that which would be expected if Juliae carries two factors for anthocyanin colour, one an intensifier of the other, and the oxlip one factor for yellow, but the latter carries in addition a factor which inhibits anthocyanin colour. This factor has not been found in the primrose. Most of the oxlips used obviously carried this factor in double dose, as all their first generation progeny with Juliae were yellow. The oxlips which gave half coloured and half yellow progeny when crossed with Juliae were obviously heterozygous for this factor. Presumably some oxlips must exist which lack this inhibitory factor altogether.

Mr. W. B. TURRILL and Mr. E. M. MARSDEN-JONES likewise found some oxlips which were heterozygous for this factor, and have kindly sent me a large first-generation family, in which about half are coloured and half yellow.

The numbers in the different classes of the second generation and back-cross families of the Oxlip-Juliae crosses, that is, anthocyanin-coloured, yellow and white are unfortunately not very regular. On the whole they are most in accordance with the assumption that even a single dose of the inhibitory factor is sufficient to suppress the effect of any combination of the two pairs of anthocyanin colour factors. Taking the second generation figures alone, however, they agree best with the view that a single dose of the inhibitory factor is sufficient to suppress the colour factors in all combinations except where both of them are present in double dose. One plant in the second generation and two in the back-cross with Juliae were scored as cream-flowered, but the genetic character of these plants has not been worked out.

Hairiness likewise seems to be inherited similarly in both primrose × Juliae and oxlip × Juliae crosses. In the experiments with the latter the numbers of the different classes do not fit the expectation as closely as in the former case, but nevertheless they are reasonably well accounted for by the assumption that the oxlip carries two factors for hairiness, as does the primrose, and again that *P. Juliae* carries a factor that inhibits the production of hairs. As in the case of the inhibitor of flower colour it appears most probable that this inhibitor of hairs is able to suppress the effect of the factors for hairs in all cases except where they are both present in double dose, and the inhibitor present only in the heterozygous condition.

The pedunculate nature of the inflorescence typical of the oxlip is dominant to the non-pedunculate or solitary flowered condition of Juliae, though the first generation hybrids may throw up a few solitary flowers early in the season. In back-crosses with *P. Juliae* a good 1 : 1 ratio of pedunculate to non-pedunculate plants was obtained, as expected on the basis of a single factor difference. In the second generation families, however, there is rather a large excess of pedunculate plants, the numbers being 87 : 11 instead of the expected 3 : 1. The pedunculate condition is one which is greatly affected by the physiological condition of the plant, which probably accounts for this deviation.

The eye colour of the oxlip is orange, and that of *P. Juliae* yellow. All the first generation plants have an orange eye. The inheritance of eye colour appears to be determined by a single factor difference, as a good 3 : 1 ration (70 : 24) of orange and yellow-eyed plants was obtained in the second generation. In the back-cross to Juliae, however, the ratio was 35 : 56 instead of the expected 1 : 1, and out of 59 plants from the back-cross to the oxlip, 16 had yellow eyes instead of all being orange. These divergences from expectation are probably due to the fact that in young flowers the eye is always yellow, even though later it becomes orange, and in the particular cross this character was scored only once.

A number of crosses were made between the cowslip *P. officinalis* and various other species and forms including *P. Juliae*, *P. elatior*, *P. acaulis*, and two polyanthus varieties, but the number of plants obtained from any of these crosses has so far been too limited to warrant genetic analysis.

Several crosses were made reciprocally between *P. Juliae* and the polyanthus variety 'Cloth of Gold.' In the second generation only twelve plants have yet flowered, but out of these it has surprisingly been found that three are practically identical in appearance with *P. Juliae*. In the original crosses from which these three plants have come the polyanthus was the female parent. The recovery of three plants of one parental type is the more remarkable in view of the fact that out of 32 plants obtained from crossing the first generation 'Cloth of Gold' × Juliae hybrids back on to Juliae, none is typical Juliae in appearance. Chromosome counts have been made in root tip cells of two of the first generation hybrids, and two of the Juliae-like segregates. All have the normal chromosome number. The case is being studied further.

The abnormal forms of polyanthus, 'Jack in the Green,' and 'Hose in Hose,' when crossed with the primrose and *P. Juliae* were found to be dominant to the normal type. A cross between 'Jack in the Green' and Juliae, for instance, gave half foliaceous calyx and half normal type progeny.

The pedunculate type of inflorescence and the orange eye of the oxlip have been found to be dominant to the solitary flowered condition and the yellow eye of the primrose, but this cross has not been studied in detail.

Sixty-five plants have so far flowered from crosses of short-styled common primroses with blue primroses. Of these 33 were long-styled and 32 short-styled, which accords with the previous observations that inheritance of this character depends upon a single Mendelian factor difference. Apart from length of style, these 65 plants are uniform in appearance. The flower is large, the eye shape and colour is that typical of the common primrose, but it is rather larger. The leaf shape, distribution of anthocyanin, and degree of hairiness are similar to those of the primrose. The tube of the corolla is tinged with colour. The flower colour is magenta, but varies greatly with age, ranging from a bright red to blue. No second generation or back-cross families have yet been studied from this cross.

Numerous other crosses have been made between various polyanthus and primrose forms, but only small progenies have been raised in most cases and no conclusions have yet been drawn from them.

In conclusion, some of the general observations on the species crosses may briefly be re-stated. The characters of thrum and pin style occur in all the species used, and their genetic relationships are the same in all cases. Thus the thrum style is dominant to pin in all crosses either within a species or between any of them. Likewise, whenever the members of a pair of characters are present in different species, instead of both being in each as are pin and thrum style, their genetic relationship is the same whichever species are crossed. Thus the pedunculate character of the inflorescence whether on the cowslip, the oxlip or the polyanthus is dominant to the single-flowered condition of either the primrose or *P. Juliae*. The semi-glabrous character of *P. Juliae* is dominant to the very hairy condition of all the other species used; the orange-coloured eye of the oxlip is dominant to the yellow eye of either the primrose or *P. Juliae*. And finally, the anthocyanin coloured flower is dominant to either the white or the yellow flower of any species except where an inhibitor is present, as in most oxlips.

INDEX OF PRIMULA CONFERENCE REPORT.

(*References in italics are to illustrations.*)

Adamson, J., on cultivation of new Primulas, 77
Azalea indica, 51
Bamboo, 61
Braya sinensis, 61
Caryopteris incana, 57
Cherry scrub in China, 61
Chinese Primulas, their habitats, 51
Colour in Primulas, 50
Conference, papers presented, 3
Cortusa Matthioli, 15, 17
Corydalis, 62
Cremanthodium, 62
Cymbalaria muralis, 54
de Winton, D., on inheritance in Primula sinensis, 84
Dionysia, 45
— Bornmuelleri, 45
Distribution of Primulas, 47, 51
Eriocaulon Schochianum, 54
Exhibition of Primulas, 1
Farina in Primula, 11, 50
Fir forests, Primulas in, 53 *et seq.*
Forrest, G., *see* W. W. Smith
Gentians, 60
Gould, N. K., on Primulas at Wisley, 69
Handel-Mazzetti, H., on natural habitats of Primulas, 51
Huskins, C. L., on Primula Juliae and its hybrids, 95
Iris phragmitetorum, 54
Keys to sections of Primula, 6, 9
Leontopodium Jacotianum minus, 60
Lonicera, 56
Lysimachia thyrsiflora, 56
McLaren, H. D., on Asiatic Primulas in the garden, 63
Macleayi cordata, 57
Nephrodium Thelypteris, 54
Newton, the late W. C. F., *see* C. Pellew
Omphalogramma Coxii, 46
— Delavayi, 46
— elegans, 46
— Elwesianum, 46
— Engleri, 46
— Farreri, 46
— Forrestii, 46
— minus, 46
— Rockii, 46
— Souliei, 46
— vinciflorum, 46, *49*
— Violagrandis, 46
Parochetus communis, 54
Pedicularis, 62
Pegaeophyton sinense, 61
Pellew, C., and W. C. F. Newton on Primula × kewensis, 91
Philadelphus, 56
Phragmites communis, 54
Pleione scopulorum, 60
Pogonia yunnanensis, 60
Polyanthus, 64, 95
Primula acaulis, 21
— adenantha, 36
— aemula, 39, 41
— aequalis, 34
— aequipila, 25, 52
— aerinantha, *32*, 36
— Agleniana, *33*, 39, 40, 61
— Aitchisonii, 41
— ajanensis, 15, 32
— albiflos, 40
— algida, 2, 22, *29*, 32
— Allionii, 45
— alsophila, 17
— alta, 34
— amabilis, 39
— ambita, 19
— americana, 32
— amethystina, 22
— amoena, 21
— androsacea, 26, 54
— angustidens, 43
— angustifolia, 39, 41
— anisodora, 1, 2, 13, 43, 56, 65, 70, 71
— annulata, 4, 31
— apennina, 44
— apoclita, 1, 35, 36, 73
— arctica, 41
— argutidens, 22
— aromatica, 20, 57
— atricapilla, 36, 66, 73
— atrodentata, 34, *64*, 72
— atrotubata, 19
— atuntzuensis, 39
— Aucheri, 45, 46
— aurantiaca, 1, 43, 56, 78
— aureostellata, 11, 22
— Auricula, 44, 61
— — ciliata, 44
— — Obriatii, 44
— — serratifolia, 44
— — Widmerae, 44
— auriculata, 32
— — calva, 32

Primula austrolisteri, 19
— Baileyana, 37, 63, 74
— baldschuanica, 32
— balearica, 21
— Barbeyana, 26
— barbicalyx, 18
— barybotrys, 1, 9, 53
— bathangensis, 19, *20*, 53
— Baumgarteniana, 45
— Bayernii, 39, 41
— Beesiana, 2, 43, *56*, 69, 70
— begoniiformis, 18
— bella, *28*, 29, 59, 70
— bellidifolia, 35, 36
— Biondiana, 31
— biserrata, 43
— blandula, 31
— blattariformis, 19, 20, 55
— — Duclouxii, 20
— Blinii, 30
— Bonatiana, 29
— Bonatii, 18
— Boothii, 25
— borealis, 32
— boreiocalliantha, 40
— Bornmuelleri, 45
— Boveana, 46
— brachystoma, 43
— bracteata, 27
— bracteosa, 25
— brevicula 39
— brevifolia, *21*, 22, 59, 60
— breviscapa, 25
— bryophila, 40
— bullata, 27
— Bulleyana, 2, 43, 55, 65, 69, 70, 78
— burmanica, 1, 43, *48*, 65
— Buryana, 37
— cachemiriana, 15, 34
— calcicola, 31
— calciphila, *17*, 19, 52 84
— caldaria, *29*, 32
— Calderiana, 25
— calliantha, 39, 40, 58
— — albiflos, 40
— — nuda, 40
— calthifolia, 24
— cana, 38
— candidissima, 25
— canescens, 21
— capitata, 2, *32*, 34, 35, 71, 79
— capitellata, 32, 80
— cardiophylla, 37, *65*, 74
— carniolica, 44
— carnosula, 33
— carpathica, 21
— caucasica, 32
— Cavaleriei, 13, 26
— Caveana, 38
— Cawdoriana, 36, 37, 67, 75
— celsiaeformis, 20
— cephalantha, 36
— cernua, 35, 57, 73, 80
— chamaethauna, 24
— Chamissonis, 32
— chartacea, 24, 26
— chasmophila, 36, 37
— chionantha, 1, 2, 38, 39, *40*, 59, 61, *72*
— chionota, 24
Primula chrysochlora, 48
— chrysophylla, 28, *56*, 59
— chrysopa, 2, 3, 33, 61, 66, 80
— chumbiensis, 42
— chungensis, 1, 43, 65, 71, 78
— cicutariifolia, 18, 52
— cinerascens, 16
— citrina, 31
— Clarkei, 24, 26, 37
— Clusiana, 45
— Cockburniana, 2, 3, 13, 43, *48*, 65, 70, 71, 78
— coerulea, 25
— cognata, 31
— Columnae, 21
— commutata, 44
— — cottia, 44
— compsantha, 40
— concinna, 14, 33
— congestifolia, 28
— conica, 36, 58, 73, 81
— conspersa, *29*, 80
— Cooperi, 43
— cordata, 38
— cordifolia, 21, 38
— coreana, 15, 17
— cortusoides, 2, 16, 71
— Coryana, 40, 58
— coryphaea, 29
— cottia, 44
— Craibeana, 35
— crassa, 25, 57
— crispa, 34, 80
— crispata, 35, 71, 79
— crocifolia, 39, 40, 53
— cuneifolia, 23
— Cunninghamii, 24
— Cusickiana, 39, 41
— cyanantha, 1, 2, 35, 36, 73
— cyanocephala, 34, 55
— cycliophylla, 28, 60
— cyclostegia, 29, 59
— cylindriflora, 22
— darialica, 32, 80
— Davidi, 25
— davurica, 32
— debilis, 26
— decipiens, 32
— declinis, 41
— decurva, 41
— deflexa, 1, 35, 36, 66
— delicata, 26
— densa, 18
— denticulata, 34, 54, 66, 72, 80
— — magnifica purpurea, 66
— deorum, 45
— deuteronana, 25
— Dianae, 25
— diantha, 39
— Dickieana, 11, 22, 60
— — chlorops, 22
— — Pantlingii, 22
— Dielsii, 26
— distribution, 47, 51
— doshongensis, 33
— Drummondiana, 24
— dryadifolia, *25*, 28, 59
— drymophila, 24
— Dubernardiana, *25*, 27, 61, 70, 78

Primula Duclouxii, 26, 54
— dumicola, 19, 61
— Duthieana, 39, 41
— eburnea, 36, 37
— Edgeworthii, 24, 76
— efarinosa, *29*, 32
— effusa, 1, *24*, 26, 54
— egaliksensis, 33
— elatior, *20*, 21
— elegans, 33
— elliptica, 32
— Ellisiae, 2, 38, 39, 41
— elongata, 39, 41
— epilosa, 25
— erodioides, 18, 52
— erosa, 34
— erythrocarpa, 34, 80
— Esquirolii, 25
— euchaites, 36
— eucyclia, 17, 61, 71
— euosma, 25, 61, 62
— exigua, 32
— eximia, 39, 41
— Faberi, 22, 56
— fagosa, 25, 52
— falcifolia, 39, 40
— Fargesii, 37, 52
— farinifolia, 32
— farinosa, 2, 14, 32, 60, 66, 80
— — alba, 2
— — ' Craven Gem,' 3
— Farreriana, 39, 40
— fasciculata, 14, 33, 72
— Fauriei, 32
— fea, 37
— Fedtschenkoi, 41
— Filchnerae, *17*, 18, 52
— filipes, 19
— firmipes, 42
— fistulosa, 32
— flagellaris, 29
— flava, 14, 31
— flavicans, 19, 55
— flexilipes, 1, 2, *41*, 42, 61, 82
— flexuosa, 32
— floribunda, 45, 46, *49*, 91
— florida, 30, 58
— Florindae, 2, *41*, 42, 64, 67, 68, *73*, 74, 82
— Forbesii, 2, *24*, 26, 54
— Forrestii, 1, 2, *25*, 27, 57, 66, 68, 70, 78
— Fortunei, 15
— fragilis, 31
— frondosa, 32, 80
— Gageana, 22
— Gagnepainiana, 41
— Gambeliana, 38
— Gammieana, 25
— gemmifera, 14, 15, 30, 31, 33, 38, 53, 61
— Genestieriana, 33, 60, 66
— gentianoides, 26
— geraniifolia, 17, 79
— Giraldiana, 2, 36, 73
— glabra, 14, 31, 33
— glacialis, 39, 59
— glandulifera, 29
— glaucescens, 44

Primula glomerata, 34
— glutinosa, 45
— glycyosma, 43, 55, 70
— gracilenta, 35, 36
— gracilipes, 24
— graminifolia, 40
— grandis, 20, *25*, 27
— Griffithii, 25
— hakusanensis, 23
— Handeliana, 41
— Harrissii, 33
— Harroviana, 37
— Harsukhii, 34
— hazarica, 38
— Helenae, 41
— helodoxa, 1, 2, 43, 64, 65, 71, 79
— helvenacea, 39, 40
— Hemsleyi, 33
— Henrici, 27
— Henryi, 20
— heterochroma, 21
— heterodonta, 23
— heucherifolia, 2, 17, 71, 79
— Heydei, *28*, 29
— hirsuta, 44
— — angustata, 44
— — exscapa, 44
— — nivea, 44
— hissarica, 45
— Hoffmanniana, 24
— Hoffmeisteri, 34
— Hookeri, 24
— Hopeana, 42
— Hornemanniana, 32
— humicola, 17, 61, 71
— humilis, 30
— hupehensis, 25, 52
— hylobia, 25
— hylophila, 25
— hymenophylla, 16, 58
— hypoleuca, 26, 54
— ianthina, 43
— imperialis, 43
— Inayatii, 39, 40
— incana, 32
— incisa, 30
— indobella, 29
— ingens, 39, 40
— integrifolia, 45
— intercedens, 15, 32
— intermedia, 15, 32
— intricata, 21
— involucrata, 14, 31, 33, 66, 72
— ionantha, 40
— irregularis, 25
— Jaffreyana, 38
— japonica, 1, 2, 43, 64, 65, 70
— jesoana, 17
— Jonarduni, 28
— Juliae, 11, *20*, 21, 75
— — and its hybrids, 95
— junior, 40
— kanseana, 31
— Kaufmanniana, 16
— × kewensis, 2, 45
— — and its derivatives, 91
— khasiana, 43
— kialensis, 14, 31
— kichanensis. 31

Primula Kingii, 22
— kisoana, 17
— Kitaibeliana, 45
— kiuchiangensis, 40
— Klaveriana, 25
— Knuthiana, 32
— kongboensis, 14, 33
— kweichouensis, 19
— Lacei, 45
— lacerata, *24*, 26
— laciniata, 30
— lacteocapitata, 35, 71
— lactiflora, 16
— lanata, 17
— lancifolia, 40
— latisecta, 1, 17, *49*
— laurentiana, 15, 32
— Legendrei, 30
— leimonophila, 22
— lepta, 35, 59
— leptophylla, 25
— leptopoda, 31
— leucantha, 43
— leucochnoa, 39, 40, 59
— leucophylla, 21
— leucops, 39
— lhasaensis, 38
— Licentii, 15, 33, 53
— lichiangensis, *16*, 66
— — hapala, 16, 66
— limbata, 39, 40, 61
— limnoica, 34, 66, 72
— Limprichtii, 25
— 'Lissadell Hybrid,' 2
— Listeri, 19
— Littledalei, 37
— Littoniana, 2, 35, 36, 56, 66, *72*, 75, 76
— Loczii, 31, 73
— longiflora, 2, 32, 73
— longipes, 39, 41
— longipetiolata, 40
— longiscapa, 15, 32
— longobarda, 44
— luteola, 2, 32, 66
— Maclareni, 17
— Macounii, 41
— macrocalyx, 21
— macrocarpa, 14, 22, 32
— macrophylla, 39, 41
— — neariloba, 41
— — macrocarpa, 41
— macropoda, 25
— magellanica, 32
— maikhaensis, 31
— Mairei, 36
— malacoides, 26
— mallophylla, 43, 52
— malvacea, *17*, 19
— — alba, 19
— — intermedia, 19
— marginata, 44
— Maximowiczii, 1, 38, 39, *40*, 41, 53, 67, 74
— Meeboldii, 41
— megaseaefolia, 20, *57*, 73
— meiantha, 26
— melanodonta, 43
— melanops, 2, 39, 40, 67, 73, 81
Primula melichlora, 29
— membranifolia, 14, 31
— Menziesiana, 2, 35, 66
— Merrilliana, 18, 52
— metria, 37
— Meyeri, 21
— microdonta, 1, *41*, 42, 74, 82
— — alpicola, 2, 42, 67, *73*, 74, 82
— — violacea, 2, 42, 67, 74, 75, 82
— microloma, 43, 61
— micropetala, 36
— microstachys, 20
— minima, 45
— minor, 39
— minutissima, 29
— mistassinica, 32
— Miyabeana, 43, 65
— modesta, 14, 31, 32
— mollis, 1, 16
— monantha, 33
— Monbeigii, 27
— Moorcroftiana, 41
— Mooreana, 2, 35, 66, 71
— Morsheadiana, 43
— moscophora, 29
— moupinensis, 25
— muliensis, 39, 40, 58
— multicaulis, 26
— muscarioides, 2, 35, 36, 61, 73, 81
— muscoides, 29
— mystrophylla, 28, 60
— nana, 24
— nanobella, 29
— nemoralis, 25
— neurocalyx, 12, 20
— ninguida, 40
— nipponica, 23
— nivalis, 39, 41
— — farinosa, 41
— — melanantha, 40
— nutans, 1, 2, *33*, 36, 37, 56, 67, 68, 75, 83
— obconica, 2, 18, 52, 54, 74
— oblanceolata, 43, 55
— obliqua, 39, 41
— obovata, *20*
— obtusifolia, 38
— ochracea, 41
— oculata, 17
— odontocalyx, 25
— oenensis, 44
— officinalis, 21
— Okamotoi, 17
— Olgae, 32
— operculata, 43
— optata, 39, 40
— orbicularis, 39, 41, 53
— oreina, 28, 29
— oreodoxa, 19
— oresbia, 30
— orestora, 34
ossetica, 33
— ovalifolia, 25
— oxygraphidifolia, 14, 33
— Palinuri, 44, *48*
— Pallasii, 21
— palmata, 17
— Parryi, 38, 39, 41, 81
— Partschiana, 20

Primula parva, 18
— parvifolia, 32
— parvula, 30
— patens, 16, 53
— paucifolia, 34
— Pauliana, *16*, 17
— Paxiana, 17, 52
— pectinata, 18, 30
— pedemontana, 44
— pellucida, 13, 26
— penduliflora, 37
— petiolaris, 25
— Petitmengini, 18
— petraea, 39
— petrocharis, 29
— petrophyes, 22
— philoresia, 28
— pinnatifida, 35, 36, 59, 81
— pintchouanensis, 20
— planiflora, 55, 56
— plantaginea, 41
— platycrana, 34
— plebeia, 25
— poculiformis, 18
— Poissonii, 13, 43, 55, 65, 70
— polia, 25
— polyneura, 16
— polyphylla, 34
— praticola, 24, 61
— Prattii, 39, 40
— prenantha, 13, 43
— prionotes, 2, 42, 67, 83
— proba, 40
— prolifera, 43
— propinqua, 40
— pseudobracteata, 27
— pseudocapitata, 35
— pseudodenticulata, 34, 55
— pseudoelatior, 21
— pseudoglabra, 14, 33
— pseudomalacoides, 26
— pseudopetiolaris, 24
— pseudosikkimensis, 42, 57, 59, 74
— pudibunda, 42, 82
— pulchella, 39, 40, 58, 74
— pulchelloides, 39, 40, 74
— pulchra, 24, 26, 37
— pulverulenta, 1, 2, 3, 43, 64, 65, 70, 78
— pulvinata, 27
— pumila, 41
— pumilio, 33
— Purdomii, 39, 40, 73
— purpurea, 41
— pusilla, 29, *57*
— pycnoloba, 18, *49*
— pygmaeorum, 14, 33
— pyrolaefolia, 26
— racemosa, 20
— radicata, 33
— Ragotiana, 25
— redolens, 1, 27, 66, 78
— reflexa, 41
— refracta, 26
— Reginella, 14, 33
— Reidii, 1, 36, 37, 63, *65*, 67, 68, 75
— Reinii, 17
— reptans, 29
— reticulata, 2, 42

Primula rhodantha, 33
— rhodochroa, 29
— Riae, 22
— rigida, 39, 59
— riparia, 20
— rosea, 3, 31, 36, 64, 66, 72
— — Brockhurst var., 72
— rosiflora, 33
— Rosthornii, 19
— rotundifolia, 38
— Roylei, 25
— rufa, 27, 57, 66, 70, 78
— rupestris, 19, 33
— rupicola, *28*, 30
— Ruprechtii, 21
— Rusbyi, 39, *40*, 41, 81
— russeola, 39, 40
— sapphirina, 32, 37
— sataniensis, 16, 71
— saxatilis, 16, 52
— saxicola, 24
— saxifragifolia, 23
— scapigera, 25
— Schlagintweitiana, 34
— sciophila, 29
— scopulorum, 31
— scotica, 32
— Scullyi, 25
— seclusa, 1, 2, 16
— secundiflora, 2, 3, 42, 58, 67, 74, 82
— senanensis, 17
— septemloba, 2, 17, 57
— serratifolia, 13, *41*, 43, 61, 71, 79
— sertulum, 14, 32
— sessilis, 25
— shwelicalliantha, 40
— siamensis, 36, 37
— sibirica, 2, 14, 33, 66
— Sibthorpii, 21
— Sieboldii, 2, 16, 71
— sikkimensis, 2, 3, 42, 57, 58, 67, 74, 82
— sikuensis, 16
— silaensis, *21*, 22, 60, 70
— silenantha, 41
— simensis, 46
— sinensis, 2, 11, 19, 52
— — inheritance in, 84
— — varieties in, 84
— sinodenticulata, 34, 54
— sinolisteri, 1, *17*, 18, 57, 74
— sinomollis, 16
— sinonivalis, 40
— sinoplantaginea, 40, 59, 67, 81
— sinopurpurea, 39, *40*, 67, 73, 81
— sinuata, 25
— siphonantha, 37
— 'Sir George Thursby,' 2
— Smithiana, 2, 43, 65, 71, 79
— soldanelloides, 36, 37
— sonchifolia, *21*, 23, 24, 58
— Souliei, 30, 53
— spathulifolia, 29
— spectabilis, 45
— specuicola, 32
— speluncicola, 26
— sphaerocephala, 35, 61, 71, 79
— spicata, 36, 37
— stenocalyx, 31, 53

Primula stephanocalyx, 20
— Stirtoniana, 29
— stolonifera, 34
— stragulata, 29
— stricta, 32
— strumosa, 39, 41
— Stuartii, 39, 41, 67
— subtropica, 19, 54
— suffruticosa, 13, *21*, 23
— sulphurea, 24, 40
— — rosea, 40
— sylvicola, 1, 16
— szechuanica, 11, 39, *40*, 41, 59, 67, 74
— taliensis, 24
— tangutica, 39, 41, 53, 74
— Tanneri, 25
— tanupoda, 33
— tapeina, 27
— taraxacoides, 24
— Tenana, 20
— tenella, *28*, 38
— tenuiloba, 29
— tibetica, 14, 33, 66, 72
— tongolensis, 24, 26
— tosaensis, *16*, 17
— Traillii, 38
— tribola, 40
— triloba, 28, 29
— tsarongensis, 1, 36
— turkestanica, 41
— tyrolensis, 45
— tzetsouensis, 38, 42
— ulophylla, 27, 55
— umbratilis, 37
— Umbrella, 14, 31
— uniflora, 36, 37
— urticifolia, *28*, 30
— vaginata, 17
— Valentiniana, 22, 60
— Veitchiana, 26
— Veitchii, 2, 3, 16, 66, 71, 79
— Velenovskyi, 21
— veris, 21
— vernicosa, 24, 61
— verticillata, 45, 46, 91
— Viali, 35, 36, 56
Primula villosa, 44
— Vilmoriniana, 18
— violacea, 36
— violodora, 16
— Virginis, 22
— viscosa, 44, *48*
— vittata, 2, 42, 58, 67, 74, 82
— vulgaris, 21
— Waddellii, 29
— Walshii, 14, 33
— Waltonii, 1, 42, 67, 74, 83
— Wardii, 33, 57, 72
— Warshenevskiana, 33
— Watsoni, 35, 36, 52
— Wattii, 36, 37
— werringtonensis, 1, 2, 18, 55, 62, 74
— Whitei, 24
— Willmottiae, 26
— Wilsoni, 11, 43, 55
— Winteri, 12, *16*, 23, *24*, 67, 74, 76, 81
— Wollastoni, 37
— Woodwardii, 40
— Wulfeniana, 45
— xanthopa, 30
— yargongensis, 1, 2, 33, 57, *64*, 72
— Younghusbandiana, 38
— yunnanensis, 14, 28, 30, 31, 38, 57
— yuparensis, 22
— zambalensis, 33
Primulas, Asiatic, in gardens, 63
— at Wisley, 69
— in China, 51
— their cultivation, 63, 69, 77
Rhododendron campylogynum, 60
— Simsii, 51
Rhododendrons, 61, 62
Rowan, 61
Sections of Primula, 4, 48
Seed sowing, 64, 77
Smith, Prof. W. W., and G. Forrest on sections of Primula, 4
Utricularia salwinensis, 60
Vaccinium, 60
Viburnum rhytidophyllum, 57
Vicia Faba in China, 54
Willows, 56, 61
Wistaria sinensis, 57

OPENING OF THE NEW HALL.

JUNE 26, 1928.

THE ceremony of the opening of the New Hall of the Society, by Her Royal Highness Princess Mary, Viscountess Lascelles, took place on the afternoon of Tuesday, June 26, at 3 P.M., in the presence of the Council, a large number of distinguished guests and Fellows and friends of the Society. Her Royal Highness was met in the entrance hall of the new buildings by the Rt. Hon. The Lord Lambourne, P.C., G.C.V.O., V.M.H., President of the Society, and the members of the Council and was conducted to the platform on the dais, from which the opening ceremony took place.

On arriving at the platform, Lord Lambourne addressed Her Royal Highness in the following words:

"May it please Your Royal Highness, we, the President, the Vice-Presidents, the Council, the Fellows and Associates of the Royal Horticultural Society, with our loyal duty and greeting welcome your Royal Highness to our New Hall.

"Just twenty-four years ago His Majesty King Edward the Seventh, accompanied by Her Majesty Queen Alexandra, and in the presence of a distinguished company gathered to celebrate the Centenary of the Society, declared the then New Hall open, a Hall that had been built out of funds generously subscribed by the Fellows.

"The occasion of the Centenary of the Society was further marked by the establishment of the Gardens at Wisley through the munificence of Sir Thomas Hanbury, K.C.V.O. How great have been the benefits accruing to the Society since that occasion has been marked by the rapid increase in the Fellowship of the Society from 8,000 to 25,000, and the one care of the Administration has been to be ever ready to provide for the needs of the Society in accommodation for its Meetings and Shows and the extension of its Gardens at Wisley without calling on its Fellows and Associates for additional support.

"While the extension of the Gardens at Wisley from 60 acres to over 220 acres has been a gradual growth, it was in 1924 we deemed that the time had arrived to provide this further accommodation for Meetings and Shows, and this New Hall, which we now ask Your Royal Highness in your goodness to declare open, has been built with a floor area twice that of the Old Hall and includes additional lecture and committee rooms.

"The first Charter of the Society granted by His Majesty King George the Third in 1809 defined the objects of the Society as 'The improvement of horticulture in all its branches, ornamental as well as useful.'

"In 1861 and again in 1899 the Society had occasion to make representations to Her Majesty Queen Victoria to grant a new and a supplemental Charter to meet the requirements of the growth of the Society, and the Society has petitioned His Most Excellent Majesty King George the Fifth for a new Charter to grant a still further extension of its administrative powers suited to the progressive development of the Society. It is with great pleasure that we have just received a communication from the Secretary of State for Home Affairs saying that the new Charter has been granted.

"We view with satisfaction the continued interest in horticulture, not only as a science contributing towards the necessities of life, but also as an occupation contributing towards the social well-being of our country.

"It is with this in mind that we take the opportunity of expressing our loyal obligation to Their Majesties and to Your Royal Highness for the many visits paid to our Shows encouraging us to continue in our work and, in thanking Your Royal Highness for your presence here to-day, we desire to assure you that your gracious consent to be a Patron of this Society is an honour valued by us with pride and satisfaction.

"As a slight expression of what is to us a very great event we would take your acceptance of the accompanying work of art as a great honour. It is a key of gold ornamented by Messrs. Garrard and Company, a copy of an old French key that was found at the Bastille."

Mr. Musgrave, the Chairman of the Housing Committee, then addressed Her Royal Highness as follows:

"May it please your Royal Highness, On behalf of the Committee appointed by the Council of the Society to deal with the building of this Hall I beg humbly to submit the following brief Report.

"When your Royal Highness's illustrious grandfather opened this Society's Hall in Vincent Square twenty-four years ago, no one could have foreseen that in a comparatively short time the Society would have outgrown its home and would have required a new one more than twice as large. Yet the growth of the Society has been so rapid and continuous that for some time the accommodation available for all concerned has been inadequate.

"Six years ago the Council realized that to enable the Society to continue to fulfil the purpose for which it was incorporated, namely, the encouragement of practical and scientific horticulture, it would be necessary to provide more room not only for the fortnightly meetings, but for the Lindley Library, the staff, and the Fellows, whose numbers have increased till they now total over 25,000. Various schemes for the reconstruction of the present Hall and offices in Vincent Square were considered, but the expansion of the Society's activities was so continuous and so pressing that the provision of a new Exhibition Hall seemed the most prudent course.

"This decision having been taken the Council had to consider the location of the new building and the form it should take—problems seldom easy of solution and doubly difficult in London. In its choice of a site the Council was influenced largely by considerations for the convenience of the Fellows, and as Westminster had been found accessible and convenient by the bulk of the Fellows for many years, originally at the Drill Hall in Buckingham Gate, then at Vincent Square, the Council did not feel justified in breaking the long association of the Society with the City of Westminster.

"So it followed that in September 1922 a Committee was appointed to draw up a specification of the requirements of the Council for a new Hall and to deal with the many and various matters connected with its construction. Simplicity in design, lighting, heating, and ventilation were all essential matters for consideration, and the interests and comfort of Fellows, exhibitors, and visitors were hardly less important.

"Designs were invited in accordance with these specifications, and eventually the plans of Messrs. Easton and Robertson were accepted after a model of the proposed building had been submitted to the Director of the National Physical Laboratory. The Council has every reason to be grateful to him for the advice which he gave.

"In design the Hall is novel, the lighting being mainly from vertical windows instead of from a domed glass roof, which has hitherto been the almost universal form of lighting for such an exhibition Hall.

"The structure is built of reinforced concrete, giving an appearance of elegance and lightness, and in carrying out the work the Council has had the advantage of the expert advice and assistance of Dr. Oscar Faber as its Consulting Engineer.

"In the administrative block are contained a large lecture room on the first floor immediately over the dais; on the second floor a similar room capable of being partitioned into smaller rooms as required; and on the top floor Committee rooms which will enable the Society's Committees to judge and report on plants, flowers, fruit, and vegetables under the most favourable conditions of top north lighting.

"For the convenience of Fellows and visitors a restaurant has been provided, together with all the necessary modern appliances for kitchens and offices.

"Happily the prosperity of the Society has enabled the Council to face the financial outlay without an appeal to the generosity of the Fellows.

"The Foundation Stone of the building was laid by our President, Lord Lambourne, on October 19, 1926, and we now humbly beg Your Royal Highness that we may be allowed to record the successful completion of the work and the event of to-day's opening ceremony on a stone specially provided at the Entrance."

The Hall was then declared open by Her Royal Highness Princess Mary, who said:

"I now declare this Hall open. I rejoice at the extension of the Society's activities and at its continued prosperity, and I am very proud to be associated with it."

After the declaration of the opening of the Hall the following gentlemen were presented to Her Royal Highness:

Mr. J. M. Easton, F.R.I.B.A., *Architect.*
Mr. H. M. Robertson, F.R.I.B.A., *Architect.*
Dr. Oscar Faber, O.B.E., M.Inst.C.E., *Consulting Engineer.*
Mr. Hamilton Turner, *Quantity Surveyor.*
Captain Wykeham, *Representative of the Contractors, Messrs. Foster and Dicksee.*
Mr. A. Howell, *Clerk of the Works.*
Mr. W. J. Smith } *Representing the Workmen.*
Mr. H. A. Sommer }

Among those who accepted invitations to seats on the platform were:

Members of the Council of the Royal Horticultural Society:

The Rt. Hon. The Lord Lambourne, P.C., G.C.V.O., V.M.H. (*President*).
Lieut.-Colonel Stephenson R. Clarke, C.B., and Lady.
Mr. Wm. Cuthbertson, J.P., V.M.H.
Mr. Mark Fenwick, J.P.
Mr. T. Hay, M.V.O., V.M.H., and Lady.
Mr. G. W. Leak and Lady.
Mr. G. E. Loder, F.L.S., and Lady.
Mr. G. Monro, C.B.E.
Mr. C. T. Musgrave, V.M.H. (*Treasurer*).
Mr. C. G. A. Nix, V.M.H.
Mr. W. R. Oldham, J.P., and Lady.
Mr. J. B. Stevenson.
Mr. L. G. Sutton, C.B.E., J.P., F.L.S.
Mr. R. D. Trotter.

And the following guests:

The Rt. Hon. Sir William Joynson-Hicks, Bt., M.P., and Lady Joynson-Hicks; The Rt. Hon. Sir Austen Chamberlain, K.G., M.P.; The Rt. Hon. Sir Laming Worthington-Evans, Bt., G.B.E., M.P., and Lady Worthington-Evans; The Rt. Hon. Sir John Gilmour, Bt., D.S.O., M.P., and Lady; The Rt. Hon. Sir Thomas Inskip, C.B.E., K.C., M.P.; The Rt. Hon. Viscount Peel, G.C.B.

The Hon. J. S. Smit (Union of South Africa); Sir A. C. Chatterjee, K.C.I.E. (British India).

The Mayor of Westminster and Lady; The Bailiff of Westminster, The Rt. Hon. The Lord Muir-Mackenzie, P.C., G.C.B., J.P., and Lady.

Sir Frank Dicksee, P.R.A. (Royal Academy); Mr. Walter Tapper (Royal Institute of British Architects); Mr. W. H. Ansell (Architectural Association) and Mrs. W. H. Ansell; Sir Peter Clutterbuck (Empire Forestry Association) and Lady; Sir Charles Close (Royal Geographical Society) and Lady; The Marquis of Headfort (Royal Horticultural Society of Ireland); Sir Daniel Hall, K.C.B., M.A., F.R.S. (John Innes Horticultural Institute); Sir John Sandeman Allen, M.P. (Royal Colonial Institute), and Lady; Mr. G. E. W. Beeson (The Worshipful Company of Gardeners) and Lady; The Master of the Worshipful Company of Fruiterers; Dr. G. T. Moore (Missouri Botanic Gardens) and Lady.

Mr. Courtney Page (National Rose Society) and Lady; Mr. R. Cory, F.L.S. (National Dahlia Society), and Lady; Mr. E. H. Christy (National Sweet Pea Society); Mr. C. Engelmann (British Carnation Society) and Lady; Major G. Churcher (British Gladiolus Society) and Lady; Mr. Edmund Charrington (National Carnation and Picotee Society) and Viscountess Combermere; Sir William Lawrence (Iris Society) and Lady Lawrence; Admiral Heneage-Vivian (Rhododendron Association); Mr. C. H. Curtis, F.L.S. (National Chrysanthemum Society).

Mr. A. G. Merryweather (Horticultural Trades Association) and Lady; Mr. R. Hayward (Retail Fruiterers and Florists Association) and Lady.

General The Rt. Hon. Sir Neville Lyttelton, P.C., G.C.B., G.C.V.O. (Governor-General of the Royal Hospital, Chelsea), and Lady; Major-General G. J. Farmar, C.B., C.M.G. (Secretary of the Royal Hospital, Chelsea), and Lady; Lord and Lady Harewood; The Rt. Hon. Lord Leigh; The Rev. Shepley Smith; The Rt. Hon. The Earl of Mayo; Viscountess Boyne; Mr. G. J. Ingram; Miss Lawrence; Lady Aberconway; The Hon. Mrs. H. D. McLaren; Mr. Merritt of Messrs. Cluttons; Colonel Lord Henry Seymour, D.S.O., and Lady; The Rev. Canon Partridge; Mr. H. J. Greenwood, D.L., J.P.; Sir Jeremiah Colman, Bt., V.M.H., and Lady.

The Viscount Ullswater, G.C.B., and Lady.

Mr. Cecil Hanbury, M.P., F.L.S., and Lady; Mr. C. R. Scrase-Dickins, M.A., D.L.

Mr. W. A. Bilney, J.P., V.M.H., and Mrs. W. A. Bilney; Mr. F. R. S. Balfour, M.A., D.L., J.P., V.M.H., and Lady; The Rev. G. E. Engleheart, M.A., V.M.H., and Lady; Mr. F. J. Hanbury, F.L.S., V.M.H.; Dr. A. W. Hill, C.M.G., M.A., F.R.S., F.L.S., and Miss Hill; Mr. J. Hudson, V.M.H.; Mr. H. B. May, V.M.H.; Lieut.-Colonel Sir David Prain, C.M.G., C.I.E., LL.D., F.R.S., F.L.S., V.M.H.; Mr. R. W. Wallace, J.P., V.M.H.

Dr. A. B. Rendle, M.A., F.R.S., V.-P.L.S., V.M.H., and Lady; Dr. J. A. Voelcker, C.I.E., M.A., F.I.C., F.L.S., and Lady; Mr. A. E. Clarke; Mr. J. A. Marston and Lady; Mr. A. C. Harper; Mr. J. Harper and Lady; Mr. F. J. Chittenden, F.L.S., V.M.H., and Lady; Mr. M. A. H. Tincker, M.A., M.Sc.; Mr. F. R. Durham, C.B.E., M.C.; Mr. H. V. Taylor, B.Sc., O.B.E.; Mr. A. Simmonds, N.D.H.

During the afternoon the Band of H.M. Grenadier Guards, by permission of Colonel Lord Henry C. Seymour, D.S.O., (Director of Music: Captain G. Miller, L.R.A.M.,) played a programme of music.

1.	MARCHE	"Militaire op. 51"	*Schubert*
2.	OVERTURE	"The Yeomen of the Guard"	*Sullivan*
3.	SELECTION	"Lilac Time"	*Schubert*
4.	GAVOTTE	"The Language of Flowers"	*Cowan*
5.	SUITE	"The Pagoda of Flowers"	*Woodford-Finden*
6.	SELECTION	"Merrie England"	*German*
7.	VALSE	"Amoretten Tanze"	*Gung'l*
8.	CORONATION MARCH		*Percy Godfrey*

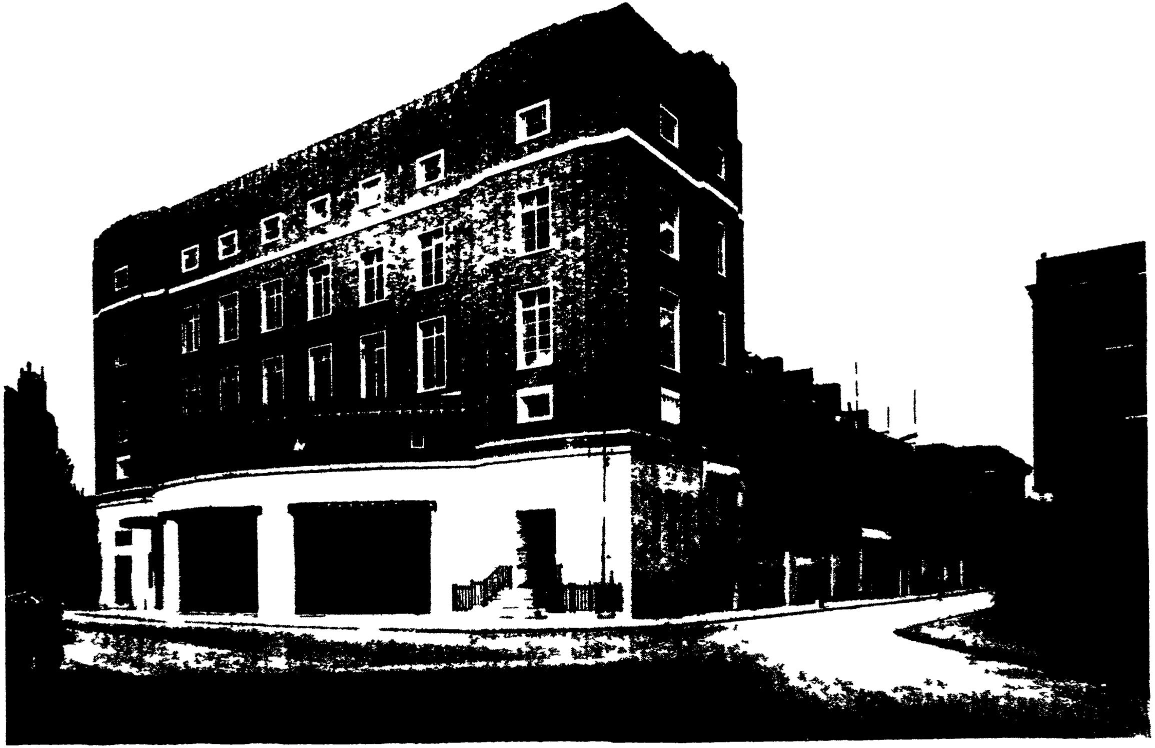


FIG 71 —EXTERIOR OF THE NEW HALL

[*To face p* 112

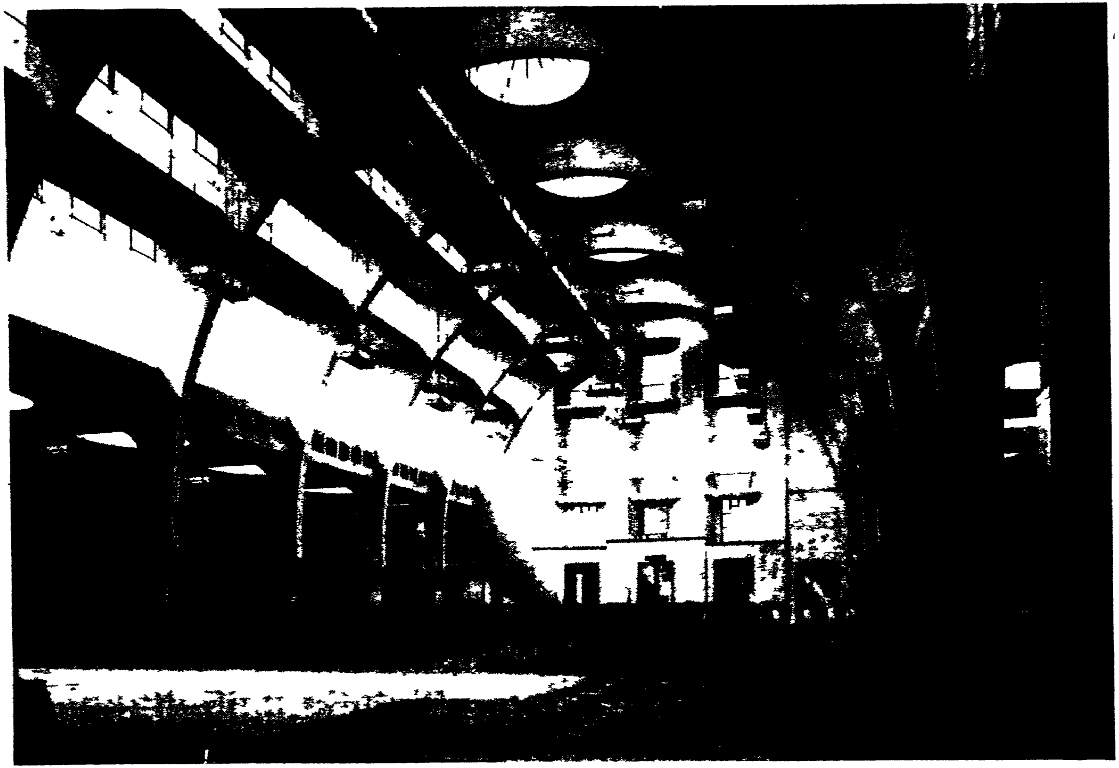


FIG 2 —INTERIOR OF THE NEW HALL

[*To face p* 113

SHORT DESCRIPTION OF THE NEW HALL.

By Mr. J. M. Easton and Mr. H. Robertson, Architects.

The form taken by the new buildings of the Society arises from an attempt to fulfil in the most direct and expressive way the special requirements of the case. A relatively small site demanded economy in planning. This has been met by keeping the entrance hall low enough to enable a dais, some 2,000 square feet in extent, to be added to the main hall, while by raising the latter several feet above the pavement, areas are dispensed with and light admitted to the basement.

The hall itself is 150 feet long by 125 feet wide, the total area being about twice that of the old hall. It is lit by four stepped tiers of clerestory windows carried on elliptical arches 58 feet high and 69 feet in span—29 feet wider and 27 feet lower than the nave of St. Paul's. The thrust of these arches is taken by the flat roof of the aisles, which act as vast horizontal girders and are tied in at the ends. The whole structure is of reinforced concrete and has absorbed 5,000 tons of Portland cement and 500 tons of steel rods. This form and construction arose from the desire to obtain lighting that would closely approximate to outdoor conditions, and which would yet lend itself to a satisfactory architectural expression and be of such a permanent nature as to require very little upkeep.

Heating is chiefly by means of panels in the concrete ceilings and cleaned and warmed air is introduced at aisle roof level. The electric lighting can be varied from the usual colour to a whiter light nearer to daylight, and ample provision is made for special lighting, power, gas, water, and telephones all over the hall.

In the basement a restaurant to seat 200 people is provided, and the kitchens are so arranged that banquets can be served in the main hall. Cloak-rooms, lavatories, heating chambers, and a large storage space are also located in the basement. The upper part of the Greycoat Street block is devoted chiefly to lecture and committee rooms. The first mentioned is equipped for use as a cinema, and it can be partitioned off into three rooms. The second and third floors have each three large rooms, those on the third floor which floral committees will use being "north lit." There are in all three electric lifts, one large hoist, and three hand lifts.

The treatment of the elevations and the detail throughout does not arise from the adaptation of any "period" style. Neither is it a denial of tradition, but rather an attempt to allow the general conception to make itself felt in, and be furthered by, every part.

A modern building is the result of co-operation by many minds and hands, and the building owes a great deal to the Director of the National Physical Laboratory, Dr. Oscar Faber, the structural engineer, Mr. Wm. MacIntyre, adviser on ventilation and lighting, Mr. Hope Bagenal, acoustical consultant, and Mr. Howell, Clerk of the Works. To these and to Messrs. Foster & Dicksee, the general contractors, to all the sub-contractors and the foremen and workmen on the job, we desire to offer our warmest thanks.

NEW CHARTER AND BYE-LAWS.

THE Charter referred to in the President's Address at the Opening of the New Hall is here printed in full, and the Bye-laws made in accordance with it follow as a Schedule to the Charter on p. 122.

The Society is incorporated for the purpose of the encouragement and improvement of scientific and practical horticulture in all its branches.

It is an educational Society for both the practice and the science of horticulture. It holds frequent meetings and lectures for the purpose of gathering together specimens of plants, fruits, flowers and vegetables, etc., demonstrating the continual advance being made in horticulture by the application of science and scientific methods, maintains a school, holds examinations, and conducts scientific research at its gardens, trial grounds and laboratories.

GEORGE THE FIFTH by the Grace of God of Great Britain Ireland and the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India.

TO ALL TO WHOM THESE PRESENTS SHALL COME GREETING :

WHEREAS a Humble Petition has been presented to Us by the Royal Horticultural Society

REPRESENTING :—

1. That by Royal Letters Patent (hereinafter referred to as "the Original Charter") granted by His late Majesty King George III, and bearing date at Westminster the 17th day of April in the 49th year of His reign, the Horticultural Society of London (hereinafter referred to as "the first Society") was incorporated for the purpose of the improvement of Horticulture in all its branches, ornamental as well as useful.

2. That upon representations to Her late Majesty Queen Victoria that the first Society had sedulously pursued and successfully promoted the objects for which it was incorporated, and in consequence of an arrangement and certain agreements made between the first Society and the Commissioners for the Exhibition of 1851 with respect to a lease to the first Society of part of the Commissioners' estate at Kensington Gore and other matters, it was by Royal Letters Patent granted by Her said late Majesty, and bearing date at Westminster the 8th day of May in the 24th year of Her reign, declared to be Her will and pleasure that the first Society should thenceforth be called "The Royal Horticultural Society" And by the same Letters Patent (hereinafter referred to as "the 1861 Charter") all persons being then Fellows or Members of the first Society and such others as should from time to time be appointed and elected in manner thereinafter mentioned and their successors were incorporated by the name of the Royal Horticultural Society (hereinafter referred to as "the 1861 Society") for the purposes for which the first Society was incorporated by the Letters Patent granted by His late Majesty King George III, with and subject to such additions and modifications to or in the same purposes as appeared in and by or flowed from or were consequent on the said arrangement and agreements.

3. That the 1861 Charter contained numerous provisions relating to the said arrangement and agreements, but the lease granted by the Commissioners to the first Society, and the said agreements expired many years ago and the said provisions of the 1861 Charter consequently became superfluous and valueless.

4. That upon representations to Her said late Majesty that it had become desirable to define more precisely the objects of the 1861 Society and to make certain alterations and improvements in the 1861 Charter with a view to expunging obsolete matter and to greater simplicity and brevity, it was by Royal Letters Patent granted by Her said late Majesty, and bearing date at Westminster the 14th day

of November in the 63rd year of Her reign, given and granted that all persons being then Fellows or Members of the 1861 Society and such others as from time to time should be appointed and elected in manner thereinafter directed and their successors should be and they were thereby incorporated by the name of The Royal Horticultural Society (hereinafter referred to as "the Society") for the purpose of the encouragement and improvement of scientific and practical horticulture in all its branches And by the same Letters Patent (hereinafter referred to as "the 1899 Charter") the Society was empowered (notwithstanding the Statutes of Mortmain) to hold deal with and dispose of the lands tenements and hereditaments then vested in or belonging to the 1861 Society and to acquire hold deal with and dispose of other lands tenements and hereditaments wheresoever situate, such other lands tenements and hereditaments not exceeding in the whole the annual value of £5,000, without incurring the penalties or forfeitures of the Statutes of Mortmain or any of them.

5. That the 1899 Charter contained divers provisions relating to the Society and its affairs and property, including provisions (a) vesting the government of the Society in a Council consisting of fifteen persons being Fellows of the Society one-fifth of whom should retire in each year and (b) declaring that the Officers of the Society should be a President one or more Vice-Presidents a Treasurer and a Secretary (all to be appointed annually) and such other officers as might from time to time be prescribed by bye-laws and (c) empowering the Council of the Society from time to time to make bye-laws for the Society and from time to time to revoke alter or amend any bye-law in manner in the 1899 Charter set forth and (d) declaring that the bye-laws of the Society might provide with respect to all or any of divers matters specified in the 1899 Charter and any matters connected with or relating to the affairs or government of the Society and (e) revoking so much of the Original Charter and the 1861 Charter as was inconsistent with the 1899 Charter.

6. That the Society has for many years carried on its work upon the following premises that is to say :—

(i) The original experimental Gardens situate at Wisley in the County of Surrey comprising an area of about 60 acres and purchased in the year 1903 for the sum of £5,000 and held by Trustees under an Indenture dated the 24th day of September 1903.

(ii) A piece of land situate in Vincent Square Westminster comprising an area of 17,110 square feet or thereabouts and held under a Lease from the Ecclesiastical Commissioners for 999 years from the 24th day of June 1902 at a ground rent of £690 per annum upon which land a Hall Library and Offices have been erected.

(iii) A piece of land situate at Wisley adjoining the Gardens mentioned under (i) and comprising an area of about 6 acres the freehold of which was purchased in the year 1914 for the sum of £210.

(iv) Another piece of land also situate at Wisley adjoining the Gardens aforesaid and comprising an area of about 136 acres the freehold of which was purchased in the year 1919 for the sum of £5,400.

(v) A piece of land situate in the Parish of Ockham in the County of Surrey adjoining the Gardens aforesaid and comprising an area of about 3·195 acres the freehold of which was purchased in the year 1926 for the sum of £128.

(vi) A piece of land situate in Elverton Street Westminster comprising an area of 26,000 square feet or thereabouts and held under an Agreement for a Lease from the Ecclesiastical Commissioners for 999 years from the 25th day of March 1924 at a ground rent of £1,300 per annum.

7. That during the last 27 years the income of the Society and the number of members admitted thereto have very largely increased; the annual income was £8,193 7s. 9d. in the year 1900 and is now more than £59,000; the members numbered 4,750 in the year 1900 and now number more than 25,000.

8. That by reason of the increase in the income and number of members of the Society and the consequent extension of its sphere of activity and usefulness, not only to its own members but also to the general public, the Hall in Vincent Square Westminster is now too small for its purposes and the accommodation of its members and a new Hall is being erected on the said land in Elverton Street Westminster, and there is (and is to be anticipated) an increasing need of additional land on which to erect premises or carry out work suitable or necessary for the meetings exhibitions investigations experiments or operations of the Society.

9. That by reason of the aforesaid increase and extension it has now become desirable to alter the provisions of the 1899 Charter relating to the lands tenements and hereditaments of the Society and the number of the Council and the status and appointment of the Secretary of the Society and to make other alterations in the 1899 Charter with a view to the most efficient conduct of the affairs of the Society And that such alterations can best and most simply be effected by the revocation of the Original Charter the 1861 Charter and the 1899 Charter and the substitution of a new Charter therefor.

10. That a draft of the Petition for this Charter with an annexed draft of this Charter (as proposed) has been submitted to and approved by the annual general meeting of the Fellows of the Society held on the 14th day of February 1928.

AND PRAYING that We would be pleased to grant to the Society a New or Supplemental Royal Charter in the terms of the draft Charter annexed to the said Petition or in such other terms as to Us with the advice of Our Most Honourable Privy Council might seem meet.

NOW KNOW YE that WE, taking the premises into consideration and being satisfied that the objects of the Society are laudable and being desirous of promoting its advancement and interest, of Our special grace certain knowledge and mere motion have granted and ordained and by these Presents for Us Our Heirs and Successors do grant and ordain That the Original Charter the 1861 Charter and the 1899 Charter shall be and are hereby revoked and annulled (but without prejudice to anything done or suffered thereunder) and the following provisions shall be and are hereby substituted therefor, that is to say:—

I.

The President Vice-Presidents and Treasurer and all other persons being now or immediately before the grant of this Charter Fellows or Members of the Society and such others as from time to time shall be duly appointed or elected as Fellows or Members of the Society hereby incorporated, and their successors, shall for ever hereafter continue and be by virtue of these presents one body politic and corporate by the name of "The Royal Horticultural Society" And them and their successors, for the purpose of the encouragement and improvement of scientific and practical horticulture in all its branches We do hereby constitute and declare to be one body politic and corporate with perpetual succession and a Common Seal, with power from time to time to alter the same, and with power to hold deal with and dispose of all personal property now or immediately before the grant of this Our Charter vested in or belonging to the Society, and to acquire hold deal with and dispose of any other personal property whatsoever, and (notwithstanding the Statutes of Mortmain) to hold deal with and dispose of the lands tenements and hereditaments now or immediately before the grant of this Charter vested in or belonging to the Society, and to acquire hold deal with and dispose of other lands tenements and hereditaments wheresoever situate, such other lands tenements and hereditaments (exclusive of any for the time being held by the Society hereby incorporated as a trustee for special purposes) not exceeding in the whole the annual value of £30,000 at the date or respective dates of acquisition, without incurring the penalties or forfeitures of the Statutes of Mortmain or any of them And with power by the name aforesaid to sue and be sued and to act and do in all things in as ample manner and form as any other body politic or corporate in Great Britain or Ireland may or can act and do.

II.

The several persons now or immediately before the grant of this Charter Fellows or Members of the Society shall continue to be Fellows or Members of the Society hereby incorporated, and shall continue and be subject and liable to all such duties and obligations as they are now or were immediately before the grant of this Charter subject or liable to as Fellows or Members of the Society, or such other duties and obligations as may be from time to time prescribed by bye-laws. Subject as aforesaid, the Society hereby incorporated shall consist of Fellows or Members of such classes and designations as may be from time to time prescribed by bye-laws.

III.

The government of the Society hereby incorporated, and of its business and affairs, shall be vested in a Council consisting of not less than 12 and not more than 18 persons being Fellows of such Society.

IV.

The fifteen persons including the President who are now or were immediately before the grant of this Charter members of the Council of the Society together with Arthur William Hill, C.M.G., F.R.S., Sc.D., of the Royal Gardens, Kew, shall be the original Members of the Council of the Society hereby incorporated and shall hold office till the Annual Meeting of such Society in the year 1929.

At that Annual Meeting, and at the Annual Meeting in every succeeding year, at least three of the members shall retire from office, and the places or place of them or any of them shall or may be filled by the election of Members at the Annual Meeting with any increase or diminution of number not contravening Clause III of this Charter, or may be left unfilled subject to the requirements of that clause, but no Fellow shall be capable of being so elected unless he shall have been nominated in writing by two or more Fellows at or before such time (being not less than fourteen days prior to the Annual Meeting) and in such manner as may be from time to time prescribed by bye-laws.

Subject as aforesaid the number of Members to retire and to be elected respectively at each or any Annual Meeting shall be such as may be from time to time prescribed by bye-laws. The Council shall prescribe the Members who are to retire at the Annual Meetings in the years 1929, 1930, 1931 and 1932 respectively, and in each succeeding year the retiring Members shall be those (other than the President for the time being of the Society hereby incorporated) who shall have been longest in office. Retiring Members shall in all cases be re-eligible unless disqualified under some bye-law for the time being in force.

V.

The officers of the Society hereby incorporated shall be a President one or more Vice-Presidents and a Treasurer, and such other officers as may be from time to time prescribed by bye-laws.

VI.

The persons who now fill or immediately before the grant of this Charter filled the respective offices of President Vice-President and Treasurer of the Society shall hold the same offices in the Society hereby incorporated till the Annual Meeting in the year 1929.

At that Meeting, and at the Annual Meeting in each succeeding year, a President one or more Vice-Presidents and a Treasurer shall be appointed by the meeting to hold office till the ensuing Annual Meeting, the holders of each of those offices being in all cases re-eligible unless disqualified under some bye-law for the time being in force.

VII.

The Council shall have power from time to time to make bye-laws for the Society hereby incorporated, and from time to time to revoke alter or amend any bye-laws theretofore made (including any bye-laws set forth in the Schedule to this Charter) Provided that no such bye-law made after the grant of this Charter, nor any such revocation alteration or amendment, shall take effect unless and until the same shall have been submitted to and sanctioned (either with or without any addition omission or alteration) by a majority of a meeting of the Fellows of the Society duly convened, it being competent for any Fellow present and entitled to vote at such meeting to propose any such addition omission or alteration as aforesaid on giving such notice (if any) thereof as may be from time to time prescribed by bye-laws And provided that the notice convening such meeting shall contain a notification that such new bye-law, or such revocation alteration or amendment, will be taken into consideration at such meeting.

Provided always that the said bye-laws shall comply with the provisions and directions of these presents, and shall not be in any way repugnant thereto or to the laws and statutes of this realm.

VIII.

Subject as aforesaid the bye-laws of the Society hereby incorporated may provide with respect to all or any of the following matters (namely) :—

(a) The carrying out of any of the objects of such Society.

(b) The qualifications election removal and classification of Fellows or Members or Associates of such Society, and the conditions of Fellowship or Membership or Association including the contributions to be paid to the funds of such Society.

(c) The number qualifications election appointment removal continuance in office and duties of the Members of the Council, and the mode of filling casual vacancies arising by death resignation or otherwise.

(d) The qualifications election appointment removal dismissal and remuneration of the officers and servants (including the Secretary) of such Society, and the mode of filling casual vacancies arising by death resignation or otherwise.

(e) The summoning and holding of, and the proceedings at, meetings of such Society, including the voting at such meetings, and the rights and duties of Fellows or Members present thereat, and the quorum necessary to constitute the same.

(f) The summoning and holding of, and the proceedings at, meetings of the Council, the quorum of the Council, and the business, powers and duties of the Council.

(g) The appointment of Committees of the Council or of such Society for inquiring and reporting to either the Council or meetings, or for the management of any part of the affairs of such Society, or the promotion or execution of any of its objects.

(h) The management of the funds and property and the conduct of the business and affairs of such Society.

(j) The publication of or the property or copyright in any papers works lectures or writings communicated to or delivered or written at the request of such Society.

(k) Any matters connected with or relating to the affairs government funds or property of such Society.

IX.

The first bye-laws of the Society hereby incorporated shall be those set forth in the Schedule to this Our Charter.

IN WITNESS WHEREOF We have caused these Our Letters to be made Patent.

WITNESS Ourself at Westminster the ninth day of July in the year of our Lord 1928 and in the nineteenth year of Our Reign.

By Warrant under the King's sign manual.

SCHUSTER.

The SCHEDULE above referred to :—

BYE-LAWS.

CHAPTER I.

GENERAL.

1. All the existing bye-laws of the Society are hereby revoked, and the following bye-laws are substituted in their place.

2. Wherever the context or meaning requires it, words implying the singular shall imply the plural, and male female, and vice versa.

CHAPTER II.

ELECTION AND ADMISSION OF FELLOWS.

3. Every candidate for admission as a Fellow of the Society must be nominated in writing by a Fellow of the Society in the Form marked A in the Second Appendix hereto and must himself duly complete and sign the application for admission in the said Form and send it by post or otherwise to the Secretary of the Society. A list of the candidates shall be posted in the Society's Hall at least two weeks before the date of the election and no candidate not included in the list shall be considered for election. Every election shall be made at a meeting of the Council of the Society, the majority of the Members of the Council present and voting to elect or reject the candidate. The Secretary

shall inform the candidate of his election and shall at the same time send to him a print of the Charter and Bye-laws of the Society. Women as well as men are admissible as Fellows, but firms and corporations are not admissible.

4. Every candidate elected as aforesaid shall become a Fellow on paying his first subscription and entrance fee (if any), and subject to such payment shall enjoy the rights and privileges of a Fellow from the date of his election.

CHAPTER III.

SUBSCRIPTIONS, ENTRANCE FEES AND PRIVILEGES OF FELLOWS AND ASSOCIATES AND ELECTION OF ASSOCIATES.

5. The subscriptions, entrance fees and rights and privileges of Fellows and Associates and the mode of election and status of Associates shall be such as the Council shall from time to time determine, and unless and until otherwise determined shall be those set out in the First Appendix hereto and (as to Associates) in Bye-law 8.

6. The annual subscription is payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, shall pay the annual subscription for the current year; if elected on or after the 1st July and before the 1st of October, he shall pay half a year's subscription; if elected on or after the 1st of October and before the 1st of January, he shall pay at the time of his election the full amount of the subscription for the year commencing from the 1st day of January then next, and no further subscription until the next succeeding 1st of January.

7. A Fellow whose subscription is in arrear shall not be entitled to vote at any meeting of the Society, or to exercise any other rights or privileges of a Fellow. All subscriptions not paid within three calendar months from the due dates shall be reported to the Council who may take any steps which they may consider expedient in respect thereof.

8. The provisions of Bye-laws 3, 4, 6 and 7 shall apply to Associates and their subscriptions, but with and subject to the necessary variations in those provisions and in the Form marked A in the Second Appendix hereto.

CHAPTER IV.

HONORARY FELLOWS.

9. Persons who have rendered distinguished service to Horticulture may be elected by the Council as Honorary Fellows of the Society.

10. There shall be transmitted to each Honorary Fellow, after his election, a diploma of his election under the common seal of the Society.

11. Honorary Fellows shall not be liable to pay any subscription or entrance fee. They shall be entitled to free admission to the

Society's Hall, Rooms, Gardens, and Libraries, and to all Meetings, Conferences and Shows of the Society (subject in every case to the regulations of the Council for the time being in force) but shall not be entitled otherwise to attend or to vote at any meeting of the Society. The Bye-laws concerning the removal of Fellows shall apply (with the necessary variations) to the removal of Honorary Fellows.

CHAPTER V.

RETIREMENT, DISQUALIFICATION AND REMOVAL OF FELLOWS AND ASSOCIATES; AND REMISSION OF SUBSCRIPTIONS.

12. Any Fellow or Associate who desires to retire from the Society shall be at liberty to do so (except as mentioned in Bye-law 15), provided that he shall have paid all subscriptions and arrears and other sums, if any, due from him to the Society, and shall have returned or made full compensation for any books or other property borrowed or taken by him from the Society, by giving to the Secretary, before December 31st in any year, at the offices of the Society, a written notice of such his desire; but until the receipt of such notice every Fellow or Associate, unless removed from the Society under the bye-laws, shall remain liable for all subscriptions including any arrears.

13. If any Fellow or Associate purposes to reside abroad for the whole of any calendar year or years and gives due notice of such his intention in a letter addressed to the Secretary at the offices of the Society, the Council may release him from all or any payments to the Society in respect of any complete year or years of his residence abroad; but he shall not, during such period, enjoy any of the rights or privileges of a Fellow or Associate.

14. A letter shall be addressed to each Fellow or Associate of the Society whose subscription is in arrear for half a year reciting the terms of his undertaking with the Society and requesting the payment of the arrears within one calendar month from the date of the letter. The name of any Fellow or Associate whose subscription is thereafter in arrear shall be struck off the Society's list by the Council at or after the expiration of one calendar month from the date of the posting of a registered letter from the Secretary to such Fellow or Associate notifying the Council's intention in that respect, unless in the meantime all arrears shall have been paid and explanation given to the satisfaction of the Council. Any Member or Associate so struck off shall thereupon be disqualified and cease to belong to the Society but shall remain liable for any arrears of subscription or other sums due from him. But the Council may for special reasons extend any time or suspend or annul any disqualification under this Bye-law in any case and in any manner which they shall think proper.

15. A Fellow or Associate may be removed from the Society as follows:—

A written request for removal shall be signed by at least 10 Fellows and/or Associates and shall state that in their opinion the Fellow or

Associate concerned (in this Bye-law hereinafter called " the Member ") has conducted himself in a manner derogatory to or unworthy of the character of the Society or prejudicial to its interests or objects and shall give short or general particulars of the alleged conduct on which the request is based.

Such request shall be sent to the Secretary at the offices of the Society and shall be treated as a confidential communication and shall be brought before the Council at their next meeting but the name of the Member (though communicated to the Council) shall not be made public.

The Council shall thereupon consider the request and (unless deciding that a *prima facie* case for enquiry has not been made out) they shall refer the request either to some existing Committee of the Council or of the Society or to a special Committee of any persons to be appointed by the Council. Such Committee shall as soon as practicable deal with the request by appointing a place and time for the consideration thereof and shall give by registered post to the Member at least ten days' written notice of the place and time so appointed; a copy of the request and a statement of the reference to the Committee shall accompany the notice, and the Member shall at the same time be invited to attend in person before the Committee at the appointed place and time.

The Council may without any such request refer to any such Committee any allegation or matter concerning the conduct of a Fellow or Associate which may be brought to their notice, and in any such case the same procedure shall be adopted and the same results shall follow as in the case of a written request duly signed for the removal of such Fellow or Associate, but subject to any modifications which the circumstances may require and with the substitution of any member or members of the Council deputed in that behalf for the Fellows or Associates signing the request.

At the meeting of the Committee at the appointed place and time the Fellows or Associates signing the request (or one or more of them on behalf of all) and the Member (if attending) shall place before the Committee the facts, documents and evidence upon which they respectively rely in support of or opposition to the request, and the Committee in their discretion may hear witnesses and arguments and allow cross-examination on either side and generally arrange the procedure and conduct of the matter as they shall think proper.

The Committee shall as soon as practicable thereafter prepare and present to the Council a Report summarising the matter and the evidence adduced, and stating whether or not they recommend the removal of the Member.

The Council shall consider the Report not less than 28 days after its presentation. If the Report recommends the removal of the Member the Council shall by written notice invite him to put forward at or within a fixed time (and either in writing or at the option of the Council by attendance in person or by any representative at a meeting of the Council) any reasons against the adoption of the recommendation; any such reasons put forward at or within the time fixed by the notice shall be considered by the Council, and if after such consideration or in default of any such reasons so put forward the Council shall adopt the recommendation by a vote of at least two-thirds of the members of Council present and voting then the Member shall *ipso facto* be removed from being a Fellow or Associate of the Society, but he shall remain liable for any arrears of subscription or other sums due from him and shall not be entitled to the return of any subscription or entrance fee already paid.

The Member shall not be at liberty to retire from the Society between the dates of the first communication to the Council and their final decision to reject or adopt the recommendation of the Committee.

Any member of the Council signing the request (or deputed as aforesaid) or being a member of the Committee shall not be entitled to vote at any meeting of the Council at which the Report shall be considered rejected or adopted, and if by inadvertence or otherwise he shall vote at any such meeting his vote shall not be counted.

Written notice of the ultimate decision of the Council shall be given to the Member as soon as practicable.

16. The Council may for special reasons wholly or partially remit or waive the payment of any subscription, entrance fee or arrears of subscription in any case and in any manner which they shall think proper.

CHAPTER VI.

ANNUAL AND SPECIAL MEETINGS.

17. There shall be held in every year, on a day in February to be fixed by the Council, a meeting of the Fellows of the Society, to be called the annual meeting.

At this meeting the Council shall present to the Society a Report of their proceedings for the past year (including the statement and report mentioned in Bye-law 71); the election of members of Council and Officers of the Society, as prescribed or authorised by the Charter and Bye-laws, shall take place; and any other business relating to the affairs of the Society may be transacted. Any Fellow wishing to move a resolution at the annual meeting shall before the preceding 14th day of January give written notice to the Secretary of the precise terms of the proposed resolution, except in the case of any resolution which the Chairman may think fit to accept without such notice, either as being a matter of general routine or of minor amendment of a previous resolution or as being a matter for any special reason requiring or deserving to be dealt with in that manner. Notice of the day, time, and place of the annual meeting shall be sent by post to all Fellows of the Society not less than seven days before the date of such meeting.

18. The Council may, whenever they think fit—and they shall upon a requisition in writing signed by not less than fifty Fellows of the Society—call a special meeting of the Society; but every such requisition shall express the object of the meeting proposed to be called, and shall be left at the offices of the Society, addressed to the

Secretary; and upon receipt of such requisition it shall be the duty of the Council to call a special meeting to be held within one calendar month thereafter.

Notice of the day, time, and place of any such special meeting called upon a requisition of Fellows, and full particulars of the business to be transacted thereat, shall be given not less than 14 days before the meeting by advertisement in one or more of the London newspapers or (at the option of the Council) by notice posted to the Fellows; and at such meeting no other business except that for which the meeting is called shall be transacted.

19. The annual and special meetings shall be held at the usual place of meeting of the Society, or at some other convenient place or places appointed by the Council, and at such times as may be determined by the Council.

CHAPTER VII.

PROCEEDINGS AT ANNUAL AND SPECIAL MEETINGS.

20. The quorum present at any meeting shall be fifty, and no business shall be transacted unless such quorum is present.

21. If within half-an-hour from the time appointed for the meeting a quorum is not present, the meeting, if a meeting called upon a requisition of Fellows, shall be dissolved; in any other case it shall stand adjourned to such place, day, and time as the Council shall direct; and if at such adjourned meeting a quorum is not present within half-an-hour from the time appointed for such meeting, the meeting shall be dissolved.

22. The President, or in his absence the Vice-Chairman of the Council, or in the absence of both of them some other member of Council, shall take the chair at all meetings; in case of the absence of all the members of Council, one of the Vice-Presidents shall take the Chair, or in case of their absence, the Fellows present shall choose one of their number as Chairman.

23. At all meetings notes of the proceedings shall be taken, and minutes thereof shall afterwards be duly copied in a minute book to be kept for that purpose; and the first business shall be to confirm the minutes of the last meeting, and the Chairman of the day shall sign the same.

24. The Chairman may adjourn any meeting from time to time, and from place to place, but no business shall be transacted at any adjourned meeting other than such as was proposed to have been transacted at the meeting from which the adjournment was made.

25. Notice of such adjournment shall be given in such a manner as the Chairman of the meeting may direct.

26. The Council shall have power to direct that the voting on any question brought before the annual or any special meeting shall, if they think it advisable, be taken by ballot or poll.

27. At all meetings the voting shall be open, except in the special cases where a ballot is directed by the Council or required by the Bye-laws.

28. When the voting is open, it shall be conducted in such manner as the Chairman shall think most convenient for ascertaining the sense of the majority of the meeting. When the voting is by ballot, the ballot shall be conducted as the Council shall direct.

29. The decision of the majority of Fellows voting at a meeting shall be considered as the decision of the meeting, except in the special cases where a larger majority is required by the Bye-laws, or where the consideration of a proposal is adjourned under Bye-law 30 or 33. In the case of an equality of votes the Chairman shall have a second or casting vote, but not to make up a prescribed quorum.

30. With respect to any proposal brought before an annual or special meeting and considered by the Chairman, or by a majority of the Members of Council present at such meeting, to be of importance to the welfare of the Society, the Chairman may, and (if requested by a majority of the Members of Council present) shall, (whether a vote shall have been taken or not) adjourn the consideration of such proposal to a subsequent special meeting (to be held within two calendar months thereafter), to enable the Council (if they think fit), between the two meetings to refer the decision on such proposal to the whole body of the Fellows, and to take a poll of the Fellows "for" or "against" it; and in the event of such adjournment any vote already taken upon such proposal shall be deemed inoperative and not to have been taken. And the meeting shall thereupon nominate four Fellows to act as scrutineers of the poll (if taken), two of whom shall be chosen from the Members of the Council, and two from the general body of Fellows holding no official position in the Society.

31. If the Council shall resolve to refer the decision on any proposal (the consideration of which has been adjourned under Bye-law 30) to the whole body of the Fellows, the Council shall, within 28 days after the meeting at which such adjournment has taken place, issue by post to every Fellow of the Society residing in the British Islands (including Ireland) a copy of such proposal upon a voting paper in the form marked B in the Second Appendix hereto. The Council may by circular or otherwise explain the meaning and effect of the proposal but shall not send any other communication tending to influence the votes of the Fellows.

32. On a poll being taken upon any proposal, the scrutineers shall examine all voting papers returned to the Offices of the Society within 28 days after the dispatch thereof, and shall classify the votes of the Fellows and report the result to the Chairman of the special meeting to which the consideration of such proposal has been adjourned. On a poll every Fellow shall have one vote, and one only, and the proposal shall be decided in accordance with the result of the poll.

33. Where any proposal is brought before an annual or special meeting and the majority for or against it does not exceed three-fifths

of the total number of the Fellows present and voting, the minority shall be entitled to demand a poll of the whole body of the Fellows, in which case the consideration of such proposal shall be adjourned, and the poll shall be conducted in the manner prescribed by Bye-laws 30, 31 and 32.

CHAPTER VIII.

COUNCIL AND OFFICERS.

34. The government of the Society, and the direction of its concerns, shall be entrusted to the Council, subject to no other restrictions than are imposed by the Charter and Bye-laws, and to no other interference than may be competent to the Fellows in meeting assembled.

35. The Council may from time to time make such regulations as they think fit in regard to the Society's Gardens, Hall, Rooms, Libraries (including the Lindley Library), Meetings, Conferences and Shows and in regard to the admission thereto or user thereof including any admission of or user by the public by payment or otherwise.

36. The Council may provide for the affiliation of any kindred or Horticultural Societies and their members with the Society, and for participation in such of its privileges and upon such terms as the Council think fit.

37. The Council shall have power from time to time to appoint all salaried officials, gardeners, clerks, and other persons necessary for transacting the business of the Society; to determine their number, duties, and salaries; and to remove such persons whenever they think fit. In particular the Council may give or accept on behalf of the Society any notice for determination of employment or other notice which is to be given by or to the Society under any Agreement or otherwise.

38. The Council may appoint Committees to examine into, and report to them on, any special matters, scientific or otherwise relating to the objects or concerns of the Society; and may require such Committees to report, and may dissolve or alter the constitution of such Committees whenever they think proper.

39. The President, or any three members of the Council, may at any time call a meeting of the Council.

40. Five members of the Council shall form a quorum, and no business shall be transacted unless such quorum is present.

41. The President shall be a member of the Council ex officio, and shall be the Chairman of all meetings of the Council at which he is present. The Council shall at their first meeting after each annual meeting elect one of their members as the Vice-Chairman of the Council, and he shall always be the Chairman in the absence of the President. In case of the absence of the President and the Vice-Chairman some other member of the Council shall be elected as Chairman of the meeting.

42. The decision of the majority of members voting at a meeting of Council shall be considered as the decision of the Council. In the case of an equality of votes the Chairman shall have a second or casting vote, but not to make up a prescribed quorum.

43. Notes of the proceedings of every meeting of the Council shall be taken by the Secretary or his Assistant, and minutes thereof shall afterwards be made in a minute book to be kept for that purpose. The first business at every meeting of the Council shall be to confirm the minutes of the last previous meeting, and the Chairman of the day shall sign the same.

44. The Council shall consist of the President and fifteen other persons being Fellows of the Society. One-fifth of the Members of the Council (other than the President) shall retire in every year at the annual meeting and their places shall be filled by the election of an equal number of Members at the same meeting. In the years 1929 1930, 1931 and 1932 the Council shall prescribe the one-fifth of the original Members (other than the President) who are to retire, and in each succeeding year the one-fifth of the Members (other than the President) who have been longest in office shall retire. Retiring Members shall not be eligible for re-election in the year of their retirement, except that in each year the Council may (but shall not be bound to) nominate any one, but only one, of the retiring Members as eligible for re-election in that year, and any retiring Member so nominated shall be eligible accordingly.

45. Any member of the Council may resign his seat on the Council, and the Council shall fill up the vacancy so caused.

46. If any member of the Council dies, or becomes incapacitated from any cause whatever before the expiration of his term of office, the Council shall fill up the vacancy so caused.

47. For the purpose of the last bye-law, a member of the Council may, by resolution of the Council, be declared incapacitated who shall fail to attend a meeting of Council for six calendar months, or who shall be suffering from any bodily or mental disqualification.

48. If at the time of any annual meeting a vacancy in the Council, created by the death, resignation, or incapacity of any member, has not been filled up by the Council, such vacancy may be filled up at that meeting.

49. Any member of the Council may be removed for incapacity by a resolution passed at an annual meeting. The meeting at which such member is removed shall conclusively judge of what constitutes incapacity for the purposes of such removal; but no proposal for the removal of a member of the Council shall be entertained by an annual meeting unless there has been left with the Secretary, on or before the 1st of January preceding the annual meeting, a notice stating the name and address of the member proposed to be removed, and stating fully the nature of the incapacity in respect of which such proposal is made, nor unless such notice is signed by the Fellow intending to propose the removal, and backed by the signatures of ten other Fellows of

the Society. The vacancy in the Council so created shall be filled up at the same meeting.

50. A copy of the notice so left shall forthwith be sent by post by the Secretary, under registered cover, to the address of the member proposed to be removed.

51. A Member of Council who is elected to fill a vacancy caused otherwise than by effluxion of time shall stand in the place of the Member in whose place he is elected, and shall retire at the time when the term of office of such last-mentioned Member would have expired by effluxion of time.

52. Any retiring Member of Council who shall not have attended more than six meetings of the Council during the twelve calendar months preceding any annual meeting shall not be nominated as eligible for re-election as a Member of Council at that meeting, unless the Council shall have declared by Resolution that his non-attendance has been due to unavoidable causes.

53. The President, the Vice-Presidents and the Treasurer shall vacate their offices at the annual meeting in every year, but shall be re-eligible. In the event of any vacancy occurring in either of the offices of President and Treasurer by death, resignation or incapacity, such vacancy shall be filled by the Council, *ad interim*, until the next annual meeting.

54. No person shall at the same time hold the offices of President and Treasurer.

55. The offices of President, Vice-President and Treasurer shall be honorary.

56. A Chartered Accountant, not being a Member of the Council, shall be appointed by the annual meeting in each year to act as Auditor for the ensuing year. In the case of the Auditor dying, becoming incapacitated or declining or neglecting to act during the course of the year, the Council shall appoint another, *ad interim*, in his place till the next annual meeting.

CHAPTER IX.

ELECTION OF COUNCIL AND OFFICERS.

57. Any two or more Fellows desiring to nominate any other Fellow for election to the Council, or for appointment to the office of President, Vice-President or Treasurer, shall leave a nomination in writing signed by them at the offices of the Society before the 1st day of January preceding the annual meeting.

58. Not less than seven days before the annual meeting in each year the Council shall prepare a list of the names of all Fellows duly nominated for election as Members of Council and for appointment to the offices of President Vice-President and Treasurer respectively with the names of the nominators of each such Fellow and shall circulate such list amongst the Fellows, and such list shall (if necessary) be used as a balloting paper.

59. If the number of Fellows duly nominated for election as Members of Council does not exceed the number of vacancies to be filled at such annual meeting, all the Fellows so nominated shall be declared duly elected, and if one Fellow only shall be nominated for appointment to the office of President or Treasurer, the Fellow so nominated shall be declared duly appointed.

60. If the number of Fellows duly nominated for election as Members of Council exceed the number of vacancies to be filled, the number required to fill the vacancies shall be elected by ballot of those present at the meeting from amongst the Fellows so nominated. And if more than one Fellow is nominated for appointment to the office of President or Treasurer, the appointment to such office shall also be made by ballot of those present at the meeting from amongst the Fellows so nominated.

61. The Auditor shall be nominated and appointed in the way prescribed for the nomination and appointment of President and Treasurer, but he need not be a Fellow of the Society. The names of all persons duly nominated for appointment to the office of Auditor, with the names of the nominators of each such person, shall be included in the list provided for by Bye-law 58.

62. If any Fellow adds any name or names other than those in the balloting paper, or if he marks more than the proper number of names, his balloting paper shall be deemed void, and be disregarded by the scrutineers in casting up the number of votes.

63. If from any cause no election, or an incomplete election, of members of the Council or of officers takes place, the places of such of them as have not had their places filled up in pursuance of the Bye-laws shall be filled up by the Council.

CHAPTER X.

PROPERTY OF THE SOCIETY.

64. The property of the Society, and all additions to the same, shall be exclusively employed, under the direction of the Council, in promoting the objects of the Society as declared by the Charter ; and, save as hereinafter mentioned, no dividend, gift or bonus in money shall in any circumstances whatever be paid or made unto or between any of its Fellows. But this Bye-law shall not prevent Fellows from competing for and receiving from the Society prizes in money, awards, medals, seeds, plants, publications, etc., and shall not prevent the Council from making payments to any Fellows for expenses (incurred in connection with the business or affairs of the Society), or for remuneration for work done or services rendered for or to the Society.

65. The Council may provide for or award and pay to any actual or former officers or employees of the Society, or for or to their respective families or dependants (whether during the lifetime or after the death of the said officers or employees) any donations, gratuities, pensions, annuities or other benefits which the Council shall from time to time

consider to be advisable or proper And the Council may establish any schemes or make any arrangements for those purposes, including any schemes or arrangements for insurance and/or for contribution by or on behalf of any persons to be benefited.

CHAPTER XI.

ACCOUNTS.

66. The Treasurer or in his absence a Deputy to be appointed by the Council at their discretion shall sign all drafts to be paid by the bankers, and shall see that all receipts and payments by or on account of the Society are regularly entered in the Society's cash books.

67. All drafts signed by the Treasurer or his Deputy shall be countersigned by such of the Society's officials as the Council may appoint to this duty.

68. The Treasurer or his Deputy shall not issue any draft for any sum above £20 without the authority of the Council, except drafts for the payment of rents, rates, taxes, salaries, pensions, prizes, insurance, interest on loans mortgages or debentures, or other periodical outgoings, as and when they shall become due, in cases where the respective amounts and times of the payments have been previously fixed or approved by the Council.

69. The Chief Cashier shall, under the direction of the Treasurer or his Deputy, be responsible for all money received and paid at the offices of the Society, and shall pay the same to the Society's bankers, and, with the exception of the amount allowed him for petty cash, shall not retain in his own hands any of the Society's money, and he shall enter duly in the Society's cash books all money so received and paid.

70. The Council shall cause true accounts to be kept of the property of the Society, of the sums of money received and expended by the Society, and the matters in respect of which such receipt and expenditure take place, and of the credits and liabilities of the Society.

71. The Council shall cause to be prepared in January in every year a statement of the income and expenditure of the Society for the past year made up to the 31st day of December preceding, and a balance sheet containing a summary of the property and liabilities of the Society as on that day. The statement and balance sheet shall be certified by the Society's Auditor, and the Council shall at the annual meeting present the same to the Society, together with the Council's Report thereon.

72. A printed copy of such balance sheet and Report shall, at least seven days previously to such meeting, be sent to every Fellow residing in the British Islands (including Ireland).

73. Once at least in every year the accounts of the Society shall be examined, and the correctness of the balance sheet ascertained and certified by the Auditor. The Auditor shall be supplied with a copy of the balance sheet, and it shall be his duty to examine the same, with

the accounts and vouchers relating thereto. The Auditor shall have a list delivered to him of all books kept by the Society, and shall at all reasonable times have access to the books and accounts of the Society.

CHAPTER XII.

PUBLICATIONS OF THE SOCIETY AND COPYRIGHT.

74. Every paper or work of any Fellow or Associate communicated to and accepted by the Society for publication, and the copyright therein, shall be the property of the Society alone from the time of its being sent to the offices of the Society, and the copyright in every lecture delivered at the request of the Council by any Fellow or Associate, together with any notes, copy, draft, print or manuscript of any such lecture, and the copyright therein, shall be the property of the Society alone from the time of the delivery of the lecture, unless in any case some previous written arrangement to the contrary has been made by the Council with the author.

75. The Council shall determine what papers or works (including lectures) are to be selected for publication, and the form in which, and the time when, they are to be published, and shall decide which publications shall be included freely in the privileges of Fellows, and which excluded therefrom.

CHAPTER XIII.

COMMON SEAL AND DEEDS.

76. The Charters, the Common Seal and the Deeds of the Society shall be kept in an iron chest, or strong room, at the offices of the Society or at its bankers. A Schedule of the Deeds shall be kept at the offices of the Society and a duplicate thereof at its bankers.

77. Every deed or writing to which the Common Seal is to be affixed shall be sealed at a Meeting of the Council, or in the presence of at least one Member of the Council appointed for that purpose at a Meeting of the Council, and countersigned by the Secretary.

CHAPTER XIV.

ALTERATION OF BYE-LAWS.

78. The existing bye-laws may be revoked, altered or amended, and new or other bye-laws made by the Council; but no revocation, alteration or amendment of any existing bye-law, and no new or other bye-law, shall take effect and be binding on the Society unless and until the same shall have been submitted to and sanctioned (either with or without any addition, omission or alteration) by some meeting of the Society.

79. Every revocation, alteration or amendment of any existing bye-law, and every new bye-law, shall be printed and circulated amongst the Fellows 14 days at least before the date of the meeting at which the same is to be submitted for sanction.

80. Whenever any revocation, alteration or amendment of any existing bye-law, or any new bye-law, is submitted to a meeting of the Society for its sanction, it shall be competent for any Fellow present, and entitled to vote, at such meeting to propose any addition or alteration thereto, or omission therefrom, on giving notice in writing of his proposal, and of the exact wording thereof, and delivering the same to the Secretary at the offices of the Society seven days at least before the date of such Meeting; and no proposal other than or different from that of which notice has been so given shall be entertained by the meeting except by the consent of the Chairman. The conduct of and voting at such meeting shall be the same as those prescribed in Chapter VII. with respect to " Proceedings at Annual and Special Meetings."

81. The accidental omission to give notice of any meeting or the non-receipt of any such notices by any of the Fellows shall not invalidate any resolution passed at any such meeting.

First Appendix.

SUBSCRIPTIONS, ENTRANCE FEES AND RIGHTS AND PRIVILEGES OF FELLOWS AND ASSOCIATES AND MODE OF ELECTION AND STATUS OF ASSOCIATES.

1. Each Fellow shall pay an annual subscription, at his option, of £4 4s., and be entitled to—

(i.) A vote at all meetings of the Society ;
(ii.) One ticket by and on production of which he may obtain personal admission to all Conferences and all Annual and Special or other Meetings (including all Shows) of the Society, and to the Society's Hall, Rooms, Gardens and Libraries, subject in every case to the regulations of the Council for the time being in force;
(iii.) A copy of the Society's Journal post free ;
(iv.) Five transferable tickets ;

or of £2 2s., and be entitled to—

(i.), (ii.) and (iii.) as above ;
(iv.) Two transferable tickets ;

or of £1 1s., and be entitled to—

(i.), (ii.) and (iii.) as above ;
(iv.) The right to use his ticket either as a personal pass or as a transferable ticket.

But every Fellow electing to pay an annual subscription of £1 1s. only, and not being (*a*) a *bona fide* working gardener earning his living by the pursuit or (*b*) a person permanently resident outside the British Islands (including Ireland) shall, with his first subscription, pay also an entrance fee of £1 1s. Any question as to whether any person falls within (*a*) or (*b*) shall be conclusively decided by the Council.

2. Any Fellow wishing to commute his annual subscription may do so at any time by making one payment of Forty Guineas in lieu of a £4 4s. annual subscription; of Twenty-five Guineas in lieu of a £2 2s. annual subscription; or of Fifteen Guineas in lieu of a £1 1s. annual subscription; such commutation entitling the Fellow for life to all the privileges of the corresponding annual subscription, but not relieving him from the payment of any entrance fee or entitling him to the return of any subscription already paid.

3. The Council shall have power to elect as an Associate of the Society any *bona fide* gardener or employé in any public or botanic garden, nursery, market garden or seed establishment who may be recommended to them for that purpose by two Fellows of the Society, one of whom shall be personally acquainted with the candidate in question.

4. An Associate shall pay an annual subscription of 10s. 6d., and shall be entitled to personal admission to all Meetings, Conferences and Shows of the Society, and to the Society's gardens and libraries (subject in every case to the regulations of the Council for the time being in force), but shall not be entitled otherwise to attend or to vote at any meeting of the Society.

Second Appendix.

FORM A.

FORM OF NOMINATION AND APPLICATION FOR A FELLOW OF THE ROYAL HORTICULTURAL SOCIETY.

Name ....
Description ....
Address ....
being desirous of becoming a Fellow of the Royal Horticultural Society, I being now a Fellow of the Society, beg leave to nominate ....for that honour, who is desirous of subscribing *........guineas a year.

Signed by ....
Dated this..........day of............19..

AND I, the above-named.................................. beg leave to apply for admission as a Fellow of the Royal Horticultural Society And I undertake if and when elected duly to pay my annual subscription of *........guineas [and entrance fee of one guinea] and to observe the Bye-laws of the Society, and the Rules and Regulations which may from time to time be made under the authority of the same for the government of the Society, as long as I continue a Fellow thereof.

Signed ....
Dated this........day of............19..

* *Here insert the words four, two or one.*

(This Form when filled up should be posted to the Secretary of the Society at Vincent Square, Westminster, London, S.W. 1.)

N.B.—For Associates the recommendation of two Fellows is required. (See Bye-law 8, and First Appendix, clauses 3 and 4.)

FORM B.

VOTING PAPER to be used in cases where a Poll of the whole body of the Fellows is to be taken upon any Proposal brought before an Annual or Special Meeting.

At an Annual [or a Special] Meeting of the Society held on [date] the following Proposal was proposed and seconded, viz. :—

[Here insert the Proposal.]

or,

The Chairman [or, A majority of the Members of Council present at the Meeting] considering this to be a matter of importance to the welfare of the Society,	The majority for [or, against] the proposal not having exceeded three-fifths of the total number of Fellows present and voting, and the minority having demanded a Poll,

the consideration of the Proposal was adjourned (under Bye-law 30 [or 33]) to a Special Meeting to be held at [hour] on [date] at [place] to enable the Poll to be taken accordingly, and the Council have determined to take a Poll of the Fellows upon it.

You are requested to sign your name in one or other of the two blank spaces below, and to return this paper entire in a closed envelope addressed to the Scrutineers, R.H.S. Office, Vincent Square, Westminster, London, S.W. 1, so as to arrive there on or before the of , after which date the Poll will be closed.

I vote	Vote
FOR	AGAINST
the above Proposal.	the above Proposal.
Fellow's Signature :	*Fellow's Signature :*
....	....
Ticket Number :	*Ticket Number :*

This paper is issued by Order of the Council, and is sent by post to every Fellow residing in the British Islands (including Ireland).

Secretary.

N.B.—Nothing is to be written on this paper but the Fellow's signature and ticket number, otherwise the Voting Paper will be spoiled and the Vote will not be counted.

THE SCENT OF FLOWERS.

By Dr. F. A. HAMPTON.

[Read July 17, 1928.]

THERE is a peculiar difficulty in writing about the scent of flowers, for scent is one of the hardest things in the world to describe accurately. Our difficulty here is not due, I think, to any mysterious quality of scent, but mainly to the difficulty of recalling a scent to memory. It is easy enough to call up a clear mental picture of a clove carnation, but it is far more difficult to recall the scent that goes with it: if we can recall the scent at all it merely hovers on the fringe of consciousness, and vanishes when we try to concentrate our attention on it. This difficulty of recalling a scent is not really surprising, for it implies a faculty that would not be very useful to us and which we have therefore failed to develop. Yet it can be developed, for the professional perfumer acquires a very good memory for smells and thereby a power of describing them, and since the number of different smells that we can perceive is probably limited, we *ought* to be able to describe almost any smell by comparison. But we must bear in mind that the same smell may occur in very different settings, and that our standard of comparison may be found in some quite unexpected quarter. The smell, for example, of *Polygonum affine* and *Gilia androsacea* strikes most people as familiar, but not everyone recognizes it immediately as the smell of pigs, a smell that we meet also behind the fragrance of the border Phloxes and in the leaves of *Escallonia illinita*, and which seems disagreeable chiefly, I think, on account of its associations, for, upon detached consideration, it will be found to be not unlike the smell of Celery seed. Sometimes the standard of comparison is difficult to find, and I had always been at a loss to link up the scent of Primroses with anything but the rather similar scent of *Iris stylosa*, *Clematis Armandii*, and some species of Crocus, but a few days ago a friend suggested that it was like the scent of fresh bread and butter; she emphasized that I must think of the very best and freshest bread and butter, and I think that the description is a very good one.

In describing scents we are sometimes misled by accidental associations. I have found myself tending to associate the scent of lilac-coloured flowers with the scent of the Lilac itself, and M. GRAVERAUX must have been surprised, and perhaps a little hurt, when he saw the rose that he raised for the perfume industry and named, after his home, *Rose à parfum de l'Hay* described as hay-scented!

In order to avoid this difficulty of description I propose to examine the scent of the flower rather from the point of view of the plant, for we know that the scent of a flower, like its beauty of form and colour, exists "for other ends than our delight," and we know that those ends are to guide and attract insects for the purpose of cross fertilization. Flowers are, as it were, called into being by the insects that visit them, and we may expect to find a certain correlation between the flower and its most frequent visitors. This correlation is sometimes fairly evident. In the Aspidistra, for example, the flowers are dingy and succulent and they open flush with the ground, so that we are not surprised to find that they are fertilized by slugs. There is something rather humble and a little pathetic in the Aspidistra's choice of a clientele; there must be so little competition for the slug as a visitor.

The adaptation of the flower to its visitors is seen even more clearly in the Stapelias, the so-called Carrion Cacti; for their livid, blotched flowers not only look like carrion, but smell like it, and blow-flies come and lay their eggs on its petals. A great many flowers are fertilized by flies, and there is something disagreeable in the scent of all of them, varying from the frank beastliness of Stapelia and Privet to a stale, sickly sweetness, with a suggestion of decay, in the flowers of the Cotoneasters, Mountain Ash, Hawthorn, and many Umbelliferae.

There is some disagreement about the scent of the Hawthorn; the poets have praised it, but to most of us there is a very disagreeable smell of stale fish mixed with its sweetness. This was evident, apparently, to the professionally attuned noses of the fish porters in France, for they used to have a superstition that if they put down their load under a May tree in flower the fish would go bad. I am inclined to think that the fishy smell is more marked in the earlier-flowering species of Hawthorn, *Crataegus oxyacantha*, and that it is slight or absent from the later-flowering species, *C. monogyna*, and perhaps this may account for some of the difference of opinion about the scent.

The scent of the Elder is about the best that I have met among the fly-flowers; at a distance it has a pleasant, vinous quality that vaguely suggests champagne, but at close quarters it has that black-currant smell which easily deepens into a smell of cats, and when very strong it suggests a hot and perspiring crowd. The oil distilled from the flowers has none of these unpleasant qualities, but something of the bouquet of a muscat wine, and the elder tree has enjoyed in the past a certain clandestine association with the wine trade.

On the whole we, as gardeners, owe little to the flies for the flowers that they have created; but our debt is rather greater when we come to the bees, although with them scent seems to play a subordinate rôle, not attracting them, as it does the flies, but merely guiding them. We get the impression, in fact, as we look at the bee-flowers, that the bee is not particular about the quality of the scent or, indeed, whether the flower is scented or not, but it prefers its flowers to be in broad, easily accessible and conspicuous masses, and its general predilections are those of many gardeners. I may add, without prejudice, that the bee is partially colour blind.

Some of the bee-flowers are scentless, as, for example, the Borage family, the Aconites and the Foxgloves, and we are entitled to assume, I think, that if they are scentless to ourselves, they are scentless also to the bee; for VON FRISCH has shown, in a series of very ingenious experiments, that the bee's sense of smell is curiously like our own. They pick up smells from about the same distance as we do, and they confuse scents that we find difficult to distinguish.

Many of the bee-flowers, as we might expect, are honey-scented: the Clovers, the Lime tree, and many of the heaths. But we can find almost any type of scent among the bee-flowers, from the deep, spicy scent of the broad bean to the delicate fragrance of the Sweet Pea, with its fresh suggestion of the earth after a summer rain; but there are some rather coarse and vague scents among them, especially in the Compositae.

The flowers fertilized by moths are in a very different category. Unlike the bee-flowers they are nearly always fragrant, with a scent of distinct and usually elaborate character; unlike the fly-flowers, their scent is almost invariably pleasant to ourselves, though sometimes we may find it rather too sweet for our taste. Typical moth-flowers are the great white Evening Primrose (*Oenothera eximia*), Honeysuckle, Jasmine, Tobacco Plant, and many of the true Lilies. And I think that I may add the Columbine, *Aquilegia suaveolens*,—a very good plant which has just begun to make its way into general cultivation, although it was introduced many years ago. Its scent strikes me as a mixture of Madonna Lily with a strong smell of ripe peaches and a dash of musk, a combination that seems to match the complex but well-marked design of the flower. Under some circumstances, perhaps after fertilization, it develops a smell of black-currants.

The fragrance of the moth-flowers is, no doubt, partly due to the nocturnal habits of many of their visitors, for whom bright colours would be a useless advertisement; but there is a more positive reason in the curious fact that many of the moths are themselves sweetly scented. The scent is almost invariably confined to one sex, usually the male, and the perfume is secreted upon special scales; in some species these are assembled into a plume which can be expanded as required, and must be a remarkably efficient instrument for diffusing the scent. In some of the Erebid moths the scent-plume is brilliantly white and relatively enormous in comparison with the size of the insect, so that it looks not unlike a little scented flower.

The scent of moths has been compared, by Dr. LONGSTAFF, who has investigated it in many species, with the scent of Jasmine, Convolvulus, Honeysuckle, Freesia, Musk, Vanilla, and other flower scents. It evidently plays a part in their courtship, for Dr. CARPENTER has observed an African moth hovering over his mate, opening and shutting his scent-plume and perfuming the air around her.

I do not say that the scent of flowers definitely attracts the moths, though it may well do so, but it is reasonable to conclude, I think, that the moth-flowers furnish a *type* of scent to which their visitors are likely to be sensitive and responsive.

Besides these three groups of fly-, bee- and moth-flowers, which I have roughly sketched out, there are smaller groups and individual flowers in which we can trace a connexion between the scent and the visitor. The vinous smell of the flowers of *Calycanthus floridus* seems to be attractive to wasps, and, together with their brownish colour, it may suggest a decaying fruit, one of their favourite foods. A similar relation probably holds good for the flowers of *Akebia quinata*, and to me the flower of *Iris graminea* suggests a ripe plum, both in scent and colour, but I do not know whether it does to any insect. Another scent group could be made of the flowers, such as *Rosa lutea*, *R. sertata*, *R. Willmottiae*, *Crocus graveolens*, and *Lilium pyrenaicum*, which have a smell that is common to many insects and is usually said to be like bugs or black-beetles, though I do not think that it is as malodorous as all that ; in fact, the scent of *Rosa lutea* (or *Rosa foetida*, as, I believe, it should be called) is quite pleasant and fruit-like when it is diluted by distance or hybridization. I do not know whether any particular group of insects is attracted by this scent, but I have noticed swarms of hover-flies about the flowers of *Rosa Willmottiae* and *R. sertata*.

In spite of the careful work that has been done on flower-pollination, the relation between the flower and its visitor is sometimes quite obscure. The flowers of the sweet violet, for example, are seldom if ever fertilized by insects, and the scent gives us no clue, for it occurs in widely separated types of flower. We find it in *Iris reticulata*, the White Banksian Rose, *Asparagus tenuifolius*, and the Crab Apple *Pyrus coronaria* and, I believe, in one of the Orchids ; there is a violet element, too, in Mignonette and in *Acacia Farnesiana*. And, if I may be allowed to turn aside from the scent of flowers, there is a distinct note of violet, or more precisely of Orris, in " the excellent cordial smell of strawberry leaves dying," as Bacon called it. I mention this scent because some people have said that it is a myth, while Lady LUDLOW in Mrs. GASKELL'S story hinted that the power of smelling it was confined to a few of the oldest and most aristocratic families. Neither of these views is correct, but the scent is confined to the leaves of the wild strawberry and its relatives the Alpine and Hautbois, so that people who fail to perceive it in the garden hybrids need not write themselves off as hopelessly plebeian.

Leaving now the relation between the scent and insects, and turning to the scent itself, we find that this is made up of volatile oils, usually in very complex mixture ; and it is generally believed by plant physiologists that these oils are primarily waste products ; they are never found in direct contact with the living tissues of the plant, but they are either sealed up, as we see them in the little capsules in the skin of the orange, or locked up in chemical combinations, as we find them in the kernel of the bitter almond. In general they are poisonous to plant life—which would account for their isolation in this way—and they are therefore antiseptic, a property of which the pine tree makes use in sealing up its wounds with an antiseptic, waterproof dressing of turpentine. In fact, these waste products are often reclaimed by the plant and used in a variety of ways before being finally discarded. In some of the Labiates, such as the Peppermint and the Sweet Basil, the essential oil, which is usually scattered throughout the plant, is mobilized in the flower spike just as the flowers are opening, thus giving us an apparently primitive type of scented flower; for in none of the Labiates, I think, do the petals produce any scent. Even in the Lavender, which we naturally regard as a typical scented flower, the essential oil is produced only by the calyx, and I am inclined to think that the more deeply the calyx is coloured the softer and more flowery is the scent. But in most flowers the production of scent is much more complicated than this, and it seems as though not only waste products, but intermediate products as well, are selected, recombined with one another and stored in the flower-bud in scentless chemical combinations, which are unlocked only when the flower opens.

Sometimes a kind of pattern or design seems discernible in the mixture of essential oils that produce the scent. For example, in attar of rose we find a nucleus of geraniol, which makes up about 60 per cent. of the attar. This substance has a distinct smell of roses, though rather harsh and crude, but with it are associated traces of other substances which, each in its own way, have a rose scent. These act as overtones to the geraniol, softening and shading off its harshness, so that we might compare the scent of pure geraniol to a note struck on a tuning-fork, and the scent of the mixture to the same note played on a violin. Round this central, purely rose-scented group, there are at least three other groups—a fruit-scented group, a honey-scented group, and a spicy group—and all these groups are linked together by traces of substances with intermediate scents, which blend the whole into one design. These groupings are liable to variation, just as the colour of the flower is liable to vary, and it is partly to their presence that we owe the great variety and subtlety of scent in our hybrid garden roses.

There has been some rather wild talk lately about roses losing their scent and about the scentlessness of modern roses. We are apt to forget that there have always been scentless roses, for on account of this very defect they tend to drop out of cultivation and be forgotten. Here and there one, such as Cramoisie Superieur, manages to survive on other merits. If scentless roses are conspicuous to-day, I suggest that it is partly because of the popularity of yellow roses, for the "old rose scent" never, as far as I know, occurs in roses in which yellow predominates. The wild yellow roses are either scentless or have some peculiar, unrose-like scent of their own, and their hybrids follow them in being either scentless or smelling of tea, fruit, cowslips, Turkish tobacco, vanilla, pear-drops—of almost anything, in fact, except rose. In some of them we find scents of great sweetness and delicacy, but the public, expecting the familiar " old rose scent," is apt, I think, to disregard their fragrance.

It is possible that the " old rose scent " may be linked biologically with the colours pink, white, and red, for it occurs not only in the classical Centifolia-Gallica-Damascena group, but also in *Rosa rugosa, R. lucida,* and probably other pink roses. A similar condition seems to occur in carnations, for Mr. DOUGLAS tells me that he has been trying for more than twenty years to combine the clove scent with the colours yellow or apricot, so far without success.

Another factor controlling the scent occurs in the Musk Rose and in many members of its group, such as *R. Wichuraiana, R. arvensis,* and *R. Soulieana.* Here the so-called "musk scent" is produced only by the stamens, while the petals have a light rose-scent rather like that of the Dog Rose. I had thought that this observation was original, but on looking up the Musk Rose in PARKINSON, I found that more than three hundred years ago he wrote: " Some there be that have avouched that the chiefest scent of these roses consisteth not in the leaves, but in the threads of the flower." He need not have been so mistrustful, for the fact is easily proved by separating the stamens and the petals.

The production of a characteristic scent by the stamens has a bearing on the scent of the hybrids, for it follows that the more we increase the mass of petals by doubling the flower the less musky will be the scent.

I have spoken of the " so-called " musk scent, for it seems to me that the scent of most of the musk-scented flowers has no more than a distant family likeness to the scent of the true animal musk from the musk deer. To me the scent of the musky flowers usually has a waxy quality, which is particularly evident in the Musk Rose, and it is often mixed with a scent of honey or new-mown hay.

I can just remember the scent of the old Musk Plant (*Mimulus moschatus*), and I think that it came rather nearer than most plants do to the scent of the true musk; but it is now only a memory, for, as you know, it began to fade away from all plants in cultivation about fifty years ago, and although you may find here and there a plant in which a ghost of the old scent still lingers, it has now practically disappeared.

No one has discovered a reason for the disappearance of the scent; we only know that it is not due to the introduction of a hybrid strain nor to the dwindling of the glandular hairs which probably produced the scent. There is difficulty in the way of getting a new scented strain, for scented plants were rare even among the wild ones in British Columbia, and none of the plants near the sea were scented at all.

If we have lost one scent we have gained many new ones among the plants that are new-comers to the garden, and I need hardly remind you of the fragrance of *Viburnum Carlesii* and *V. fragrans*, of *Hamamelis mollis*, *Osmanthus Delavayi*, and *Lonicera syringantha*, which we owe to plant collectors in the Far East, and of many beautiful scents among the hybrid roses, the border carnations, and the Chinese Paeonies, which we owe to the plant-breeders at home.

I will end by mentioning one or two plants that are, I am afraid, " fit only for the gardens of the curious," but are noteworthy for their scent. The first is a mint (*Mentha citrata*), which came to me with the legend that it was the original scent of the world from which all other scents were derived, and that it would enhance the fragrance of any flower planted near it. Be that as it may, it has a very pleasant scent of Bergamot, and M. CORREVON tells me that it was one of the ingredients of Chartreuse.

The other plant is the Oriental Spikenard (*Nardostachys Jatamansi*), which was used as a perfume as far back as Sumerian times. The scent is contained in the roots, which smell of Patchouli, though their scent is rather softer and sweeter; the leaves have the unpleasant, mangy-dog smell of the nearly related Valerians, and the flowers smell rather like the Alpine Poppy.

PLINY gives the formula of Mary Magdalene's " ointment of spikenard very precious," and my friend Mr. TAYLOR, the perfumer, has very kindly reconstructed it for me.

ROBINIAS AT ALDENHAM AND KEW.

By the Hon. VICARY GIBBS, V.M.H.

THERE is no such thing as a perfect tree any more than there is a perfect man; all have their faults, and the common English Elm, one of the most beautiful things in nature, has many. Its root system is too shallow, so that it is liable to come down bodily in a gale, moreover even in the stillest weather, during the last fifty years of its life, it becomes a danger to man and beast, owing to its habit of shedding heavy boughs without a moment's warning. I could go on with a list almost indefinitely long, were it worth while; for instance, how deleterious Ashes and Beeches are to all shrubs in their vicinity, how that kind of Maple popularly called Sycamore reproduces itself far too freely by reason of its winged seeds, how the Lime or Linden tree drops a horrible black treacle composed, I am told, of some insects' excrements, and so on and so forth.

The nearest approach to a perfect tree that I can think of, which indeed owns " every virtue, every grace," has not been long enough in the country to have had its failings detected. It is *Acer griseum*, which carries lovely foliage with a dove-coloured underside, gorgeous autumn colour, polished golden-brown stem, and shows to him who has seen the sun shining through the shreds of separated, but not yet dropped, nut-brown bark, a sight for the Gods; indeed this tree needs the pen of the late REGINALD FARRER, and not my pedestrian muse to sing rightly its praises. Even I am in danger of becoming lyrical and of forgetting that Maples are not my immediate concern, so I must turn at once to prose and Robinias.

Well! The fault of this genus is undoubtedly brittleness, as will appear in the course of this paper, and that weakness leads to constant injury and sometimes to complete destruction. Except for this, Robinias are eminently suited for planting in gardens; their pinnate leaves are light and elegant and consequently do not inflict the damage on flowering shrubs under or near them which would occur if other forest trees took their place; indeed I can recall no other, except the Birch, which does so little injury to neighbouring vegetable growth. Further, they have an advantage in that their boughs do not extend beyond the stem to such a distance as to take up an undue amount of room; also, which is a merit in the eyes of " an old man in a hurry," they grow very rapidly for the first thirty years of their life, though after that they slow down markedly; finally, when in flower (and they can be counted on to flower freely) they attract every eye and, for the most part, exude delightful fragrance.

Now let us to individual species.

R. Ashei see *R. hispida.*

R. × *bella-rosea* see *Hybrids.*

R. Boyntonii is a spineless shrub, attaining about 10 feet in height, and is a native of the S.E. United States. The young shoots are smooth or at first minutely downy; the leaflets, ¾ to 1 inch long, run from 7 to 13 on each leaf; the racemes carry 8 to 12 flowers, which are pink or rose-purple, ¾ inch in length, and are borne in May–June. The flower stalks are smooth, and this is almost the only respect in which it differs from the better known *R. Kelseyi*, of which the flower stalks are bristly. It is not grown at Aldenham. A plant was acquired by Kew, from Brooklyn, U.S.A., in 1919, is now 5 feet high, but has not yet flowered there.

R. × *coloradensis*
R. × *dubia* } see *Hybrids.*

R. Elliottii
R. grandiflora } see *R. hispida.*

R. Hartwigii is a shrub up to 12 feet high, a native of N. Carolina to Alabama. The young shoots, leaf stalks, and flower stalks are densely glandular; the leaflets run 13 to 23 on each leaf, have a greyish down on the underside, and are 1 to 1¾ inch long. The flowers are densely set on the racemes and do not differ materially either in their colour, rosy-purple, or in their length, ¾ inch, from those of *R. Kelseyi.* It is not known yet to have flowered in England. The features which principally distinguish this from other shrubby Robinias are the downiness of the leaflets and their large number on each leaf. In 1923 a plant reached Kew from the Arnold Arboretum, Mass., which now has a height of 4 feet 6 inches, and we at Aldenham are fortunate in possessing a plant, probably from the same source, of 10 feet in height.

R. × *Holdtii*
R. × *Holdtii britzensis* } see *Hybrids.*

R. hispida, popularly called the Rose Acacia, is a native of the Southern United States and is naturally a shrub reaching about 10 feet in height. I should imagine that this would be far the best way to grow it as thus it would be less likely to suffer wind damage. In English cultivation it is, however, almost invariably to be found grafted at a height of 6 to 8 feet on standards of *R. pseudacacia*, and generally with boughs battered and torn by gales; indeed at Aldenham, a not specially windy place, the only way in which it has been found possible to grow it as a standard has been by constructing a stiff wire frame which looks something like a pyramidal bird cage, then fixing this to the top of the stem, and attaching the branches thereto. Even in this fashion it came to grief in a gale last year and now (1928) is only a pleasant memory. If it were obtainable as a shrub I should certainly obtain it, for the beauty of the deep rose-coloured racemes is such that a great many defects might cheerfully be borne for the joy of having such charm added to the glory of flaming June. These flowers, however, lack the fragrance which characterizes those of the common Robinia. This species has been cultivated in England since 1741. A variety called *R. hispida macrophylla* is represented at Kew; it has been grown there for over twenty-five years and is now 7 feet high. The flowers of this form are even larger and brighter than those of the type, the leaves also being larger and rounder, but the chief distinction is that the young shoots, which are very bristly in the type, are not so, or only very slightly so, in this variety. Both increase by means of root suckers, and are practically sterile.

R. hispida nana, or, as it is called when regarded as a separate species, *R. nana*, is a shrub little over 12 inches high, presumably indigenous to the S.E. United States. I believe it is not in cultivation in England, but Mr. Bean has kindly supplied me with the following botanical particulars. "Young shoots and leafstalks bristly; leaflets 9 to 15 on a leaf, each ½ to 1 inch long; racemes with 3 to 6 flowers; flowers ¾ inch long 'purple with white' (Rehder)." It is interesting as developing seed pods which is rarely the case with *R. hispida*. Besides this dwarf Robinia there is also a little group all shrubby, which are close relations of *R. hispida*, viz. *R. Ashei*, *R. grandiflora*, and *R. Elliottii*. I cannot learn that any are in English cultivation and of the two first I know nothing more. The third is said to make a shrub 5 ft. high, distinct, Mr. Bean tells me, "by reason of greyish or whitish down on young shoots and beneath the leaflets."

Hybrids. Besides the eight or ten species and the numerous *Pseudacacia* varieties, some half dozen hybrids have occurred in cultivation. It does not appear that the characteristic of exceptional vigour which marks the first generation of hybrids in several Poplars, in *Pterocarya* × *Rehderiana* and other trees, obtains in the case of this genus.

R. × *dubia* is the oldest and perhaps the best known, it is the result of a cross between *R. Pseudacacia* and *R. viscosa*, it is like the former, except for the fact that the flowers are pale pink and that the twigs have some of the viscid discharge from the glands which it gets from its other parent. From the ornamental standpoint it is not nearly so well worth growing as other species and varieties discussed in this paper. I have seen it nowhere except at Kew, where there is a tree, bought as far back as 1885, which is now no more than 24 feet high with a girth of 2 feet 6 inches.

R. × *bella rosea* is another hybrid with the same parents, but this has the viscidity or stickiness more marked and the flowers deep pink in colour. This also is not to be found, to my knowledge, outside Kew, where they have a tree 28 feet tall girthing 3 feet 6 inches.

R. × *Holdtii* has for parents *R. Pseudacacia* and *R. luxurians* (Syn. *neo-mexicana*); it originated about 1890 in Von Holdt's garden in Colorado, U.S.A. Elwes describes the leaflets as darker than those of *R. Pseudacacia* and larger than those of *R. neo-mexicana*, and the flowers as varying from blush-white to deep pink. It is not grown at Kew or Aldenham, and if it be in cultivation anywhere in England I have failed to learn its whereabouts.

R. × *Holdtii britzensis* is another hybrid believed to have the same parentage, the mother tree being certainly *R. luxurians*; it was raised by SPÄTH of Berlin in 1893, and differs only from *R. Pseudacacia* in that the standards of the flowers have purple stains. The specimen at Kew was bought from SPÄTH in 1903, and has thriven, being now 36 feet high with a girth of 2 feet 7 inches. The Aldenham plant, bought about 1913, is 15 feet high, girths 15 inches, and has a spread of 8 feet. It is the only hybrid Robinia which I possess, but "here is nought for tears," for I am doubtful whether any of them are worth growing. *R.* × *coloradensis* was raised by M. VILMORIN at Les Barres, from a seed sent him from Colorado, and is presumed to be a seedling of *R.* × *Holdtii*, though at Kew it is regarded as a variety of *R. luxurians* which, as stated above, is one of the parents of *R.* × *Holdtii*. ELWES and HENRY in their monumental work call it "a peculiar tree," but as they do not disclose in what the peculiarities consist they merely arouse our curiosity without gratifying it! The Kew specimen given by M. VILMORIN in 1905 is now 25 feet high and has a girth of 18 inches. I do not possess it.

Robinia Kelseyi is one of the latest and perhaps the most satisfactory member of the genus to be brought into English cultivation. This occurred at the beginning of the present century and by 1903 it had been planted at Kew. This specimen seems to have disappeared, for their present one dates only from 1910, and has a height of only 10 feet. Though the Aldenham collection of Robinias is greatly inferior to that of Kew both in the number and size of the specimens to be seen there, it can more than hold its own in this particular case, for I own a flourishing tree on its own roots, 15 feet high with a girth of 6 inches and a spread of 10 feet. It was first noticed in Mr. KELSEY'S nursery at Boston, U.S.A., and ELWES treats it as being a hybrid of *R. hispida* and *R. Pseudacacia*, though now I believe it is generally supposed to be a true species that somehow or other had reached Boston from its home in the Alleghenies. However that may be, it is a very valuable tree, brittle no doubt as all Robinias are, but not so bad in this respect as *R. hispida*. The bright pink flowers are a little smaller than those of that species, and are freely produced about the same time or a little later, viz. about mid-June. The only noticeable difference in the foliage from that of other species is the bright light-brown tone of the young growth. It was at one time supposed to be synonymous with *R. Boyntonii*, but this is now regarded as a distinct species.

R. luxurians, the 'Western Locust,' is described by ELWES under the name of *neo-mexicana*, by which it was always known to lovers of trees till quite recent years. REHDER now says that the true tree of that name is not in cultivation and probably not hardy, and that it differs from the *neo-mexicana* of gardens in having smooth, instead of bristly, pods. That this distinction is not of the first importance I am inclined to assume from finding that REHDER in the "Standard Cyclopedia of Gardening" calls the pods of *R. Boyntonii* "glabrous," and in his new book tells us that the same are "glandular bristly"! Elwes writes of it as a small tree reaching 25 feet in height, and he adds that when at Aldenham in 1912 he saw "a young tree 15 feet high which bore fruit in 1911, and evidently liked the hot dry summer." This specimen unfortunately was entirely destroyed by a gale in 1922, but before its lamented decease it had already easily surpassed the maximum height of 30 feet given for this species. The best plant now existing at Aldenham is a young one only 14 feet high with a girth of 11 inches. The Kew plant too, which they received from the Arnold Arboretum in 1887, was 25 feet high in 1912 and 30 feet in 1916, and has now reached 39 with a girth of 3 feet 5 inches, so that it is clear that Elwes underestimates the height which this tree can attain, at any rate when cultivated. Its natural habitat is Colorado and the neighbouring States, and it was first brought into cultivation at Harvard in 1882. Like all Robinias with which I am acquainted it has proved quite hardy at Aldenham, standing a temperature below zero without injury, although in cold wet summers *R. Pseudacacia* cannot be depended upon fully to ripen its young growth, which if a severe winter should follow is liable to be burnt away. The foliage is said to be a little smaller and a little bluer than that of *R. Pseudacacia* and there are other little botanical differences, but the general effect of the two is very similar, and it would take a much better botanist than I to say off-hand to which species a specimen belonged if it were not in flower. The colour of the flower is a pale pink—very charming but not so showy as that of *R. hispida.*

R. × *Slavinii* is a hybrid between *R. Kelseyi* and *R. Pseudacacia*, the latter being the pollen parent. The seed was collected by B. H. Slavin in the Durand-Eastman Park at Rochester in New York State, a city admirably planned, with three well and tastefully planted parks. I have no personal knowledge of this modern introduction, but I hope to obtain wood for grafting from some of my American friends. It is said to favour its maternal parent but to become more vigorous and tree-like. The young shoots are at first slightly hairy but soon become quite smooth ; the leaves with 9 to 12 leaflets are oval-oblong to ovate-oblong, 1 to 2 inches long and ½ to ⅝ inch wide, being smooth except for a slight down on the midrib beneath, when young. The racemes carry 6 to 10 rosy-pink flowers about 1 inch long. The pod is 2 to 2½ inches long roughened by small tubercles, some of which end in short prickles. The above botanic particulars have been furnished me by Mr. Bean of Kew, who is always ready to help a lame dog over a stile.

R. Pringlei was found about 1908 by Pringle in a valley near Tula in Mexico ; it is not in cultivation, but judging from the dried specimen preserved in the Kew herbarium would seem to be a handsome species.

R. Pseudacacia, the best known and commonest of the genus, is always called by those who take no special note of trees "Acacia," a quite separate genus, which it only resembles in that its leaves are pinnate, or broken up into leaflets. Still in such matters the popular voice is all-powerful and protests are useless. This species, and indeed all members of the genus which are in cultivation in England, are, I believe, natives of the U.S.A. or Mexico. The genus used to be regarded as having a more extended distribution, but modern botanists have taken all the trees of the Old World out of it, and have given them other names. It was first introduced to England in 1640, and many fine old trees are scattered about the country, for its habit of producing root suckers freely has made it widely prevalent here, and even more in France and Italy, where it can often be noticed on the railway embankments. There happens to be no specimen at Aldenham over fifty years old, and the biggest I have is no way notable for size or quality, yet, as is always the case with this species when covered with pendant racemes of pure white pea-shaped sweet-smelling flowers, it is very attractive. This is a tree that pays well for pruning, for the cutting back of the branches tends to stiffen them and to lessen the risk of breakage by wind; it is also important in the case of a tree which is naturally very brittle to see that the stem is not allowed to fork until a good height, as otherwise it is sure to get torn in two the first time a really heavy gale occurs. Seeds of it were first sent from America to France in 1601, and though the precise date of its introduction to England is unknown, yet Dr. HENRY records that trees are mentioned as having reached an "exceeding height" there by 1640. Nevertheless, it was not commonly planted until after 1823, when COBBETT began loudly to advertise its merits.

I observe that both BEAN and ELWES have been before me in telling how WILLIAM COBBETT in the early part of the nineteenth century "boomed" the "Locust Tree," by which name, owing to his acquaintance with it in the United States, he always called this Robinia. He did this both in "Rural Rides," and, more fully, in "Woodlands," which last work I have never read myself.

Mr. BEAN does not, however, disclose where COBBETT'S praises of it are to be found, consequently I have had to read for the second time 445 pages of "Rural Rides" (for of course there is no Index), before I could find them starting on p. 446 of the first edition (1830). Not that I bear him any grudge on that account, for to anyone interested in the country, its woods, its lands, its crops, its animals, its farms, this book is a treat. No doubt he is very abusive of the Tory Ministers of his day, a feature not unknown, alas! in papers of our own, and the writer's own collateral ancestor Sir VICARY GIBBS, at one time PITT'S Attorney-General, by no means escapes scot free from his lash. However, one can put up with that where there is so much else to admire. Very little of note escapes COBBETT'S eye, he can't pass a fine oak without recording the girth, or a new plantation without criticizing the planting, or a flock of ewes without estimating the quality of the wool, or a field of barley without noticing that there is only a three-quarter crop and that the grain is blackened. The style too is worthy of all praise—crisp, nervous English, simple and clear, without a redundant or wasted word. My old friend Henry Elwes used to tell me that he had tried to model his own writing on Cobbett's, and indeed he might have gone farther and fared worse. I wonder how many of your nowaday readers have heard of this book, let alone read and enjoyed it! Cobbett by his eloquent advocacy persuaded many English landowners to plant the Robinia extensively, but I doubt its having proved much to their pecuniary advantage; it is stated in Elwes and Henry's book that he raised and sold more than a million plants; for instance he records having sold 13,600 young trees to Lord Folkestone in March 1824, and, having gone to see them at Coleshill, Berks, twenty-nine months later, he crows very loudly over the fact that they then averaged a height of 16 feet, whereas other kinds planted at the same time in similar soil only reached 4½ feet to 5 feet.

Either he did not know or at any rate he ignored the fact that this rapidity of growth is not maintained after the tree has reached its majority. He justly praises it for making good firing and, owing to the fact that its wood decays very slowly when thrust into the ground, good gate posts or props for a drying ground, but no fortune is to be made out of such sources as these. Any plantation of Robinias could not profitably be left standing after the trees had reached thirty years old, owing to the slow rate of increase thereafter, and at that age they would only be fit for pit props; moreover the result in stools which would grow after felling would be worse than worthless, as they make long growths which sprawl about too weak to support their own weight, and if it should be necessary to grub up the trees by the roots, away would go any vestige of profit from the planting. How different the case with a crop of Ash, which after felling continue to supply almost indefinitely good poles and rods of various sizes. Right well did old Chaucer describe the Ash as "for nothing ill"; indeed, I cannot imagine any sensible planter, looking for profit, not ornament, from his operations, who would not choose among hardwoods the Ash, or among soft the Larch, not merely in preference to the Robinia, but to any other tree which grows in a temperate climate. No doubt on the Continent where coal is unobtainable and open fireplaces for burning wood are the general rule, the fast-growing coppice growth of this genus fit for cutting every four or five years would come in handy for firing and have a market value, but these conditions do not prevail in England. I may mention that I myself not very long ago visited Coleshill, that fine specimen of Inigo Jones's architecture, having been asked to advise the present owner, Mrs. Bouverie, about her woods in the year 1912, I think, but I can recall no clumps of Robinias.

[*N.B.*—Since writing the above I have learnt that a few years before me, viz. 1905, Mr. Elwes paid Coleshill a similar visit with a like result.]

This species is well suited for growing in London, or other large cities and towns, as it does not greatly resent an impure atmosphere. When I lived at St. Dunstan's in Regent's Park, there used to be three or four quite respectable old specimens in the garden there, though before I left in 1907 they were beginning to show signs of decay;

no doubt they were coeval with the house, and had been planted during the Regency when the Park was laid out.

The biggest known trees of this species are to be found in West Virginia and exceed 100 feet in height; and one is recorded far north in Maine reaching 95 feet (see "Elwes and Henry," vol. vi. p. 1501). Nowadays, however, it is almost hopeless to plant them in their natural habitat on account of insect plagues, especially the grub of its own beetle, or borer, *Cyllene robiniae*, which riddles and honeycombs the timber. Nowhere is it a long-lived tree, and it is liable to begin decaying at the heart when not much over fifty years old. The only man, so far as I know, whose knowledge of forestry deserves respect and who still confirms COBBETT'S estimate of the Robinia's economic value, is my friend Sir HUGH BEEVOR, Bart., of Hargham in Norfolk, and the main use to which he puts it there is the providing of stakes for the rabbit fencing. Undoubtedly the soil which suits it best is a light dry sandy one, and where this is too light and dry for other genera to thrive it might be worth planting. As I have said already I have no tree of this species deserving record, but ELWES mentions one at Frogmore 88 feet high with a girth of 14 feet 7 inches, and another at the Mote in Maidstone which was 80 feet high in 1902, besides about a dozen more running up to 86 feet in height. The tallest tree which Kew can boast measures 60 feet and girths, at 3 feet above ground, 5 feet 10 inches, no record of its age having been preserved. Kew have a much older and more interesting one, now, owing to its having been topped, only 55 feet high, but with the enormous girth of 15 feet 4 inches at 1 feet and 13 feet at 3 feet above ground. This is the original specimen presented in 1762 by the Duke of ARGYLL to Princess AUGUSTA, mother of GEORGE III., which lady was the founder of Kew as a botanic garden.

R. Pseudacacia amorphaefolia. Besides varieties with different coloured flowers, such as *R. Ps. Decaisneana* and *R. Ps. lutea*, there are a good many cultivated forms with very small leaves or rather leaflets and *amorphaefolia* is one of them. It has never been grown at Aldenham but an important tree exists at Kew which has a height of 45 feet and a girth of 5 feet 7 inches.

R. Ps. angustifolia is another of the same kind as the last with little narrow leaflets, which are ¾ to 1 inch long and only a ¼ inch wide. It is not represented either at Kew or at Aldenham, though at one time we had one which has died on us, as the Irish say.

Although there is nothing fine or large in the way of the Pseudacacia type, yet varieties are fairly well represented at Aldenham; for instance, there is an attractive specimen of the golden form *R. Ps. aurea*, which has the merit of being refined and bright without coarse gaudiness. It is 11 feet high and has a girth of 1 foot. Silver-variegated and purple-leaved forms are also known to exist, but neither Kew nor I possess either of these.

R. Ps. Bessoniana is one of the forms which varies from the type in foliage, and in the extent of its variation stands midway between it and

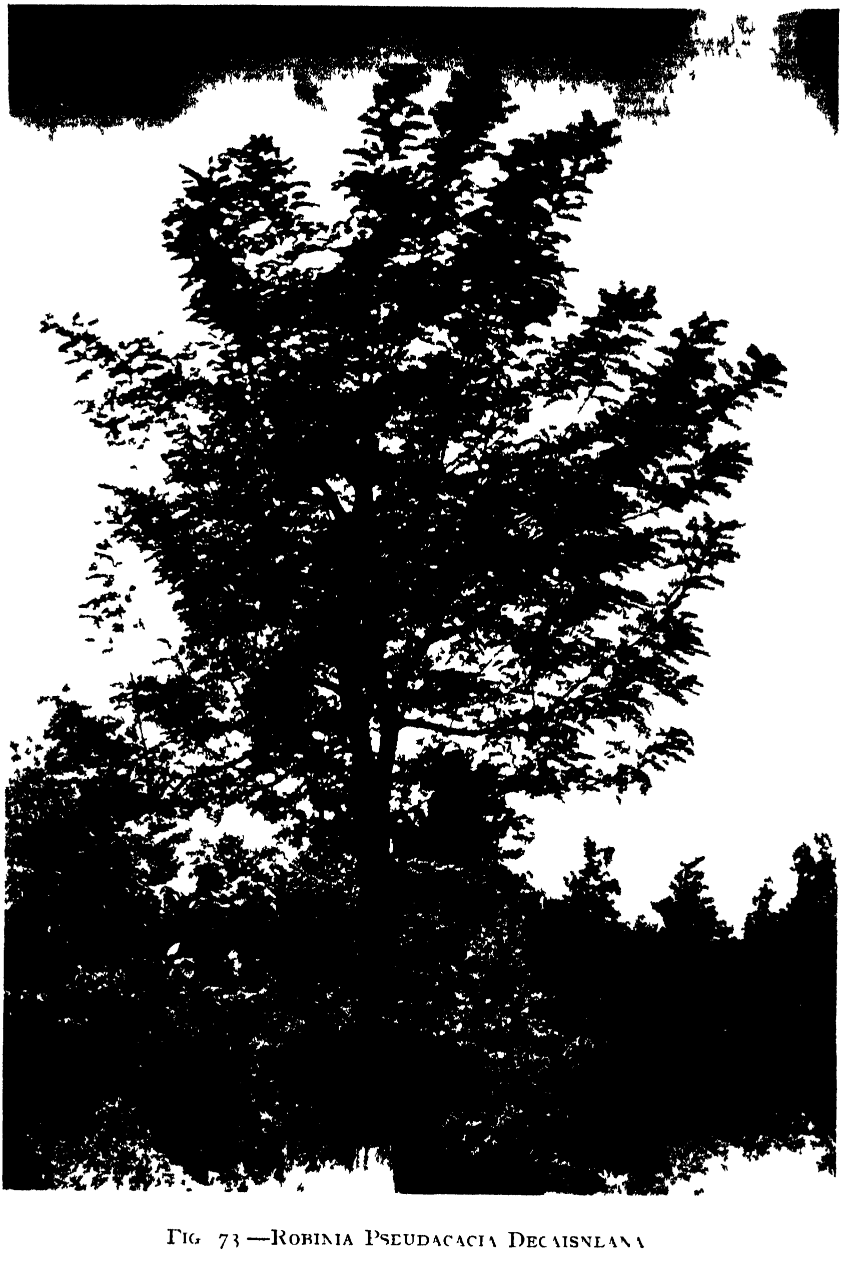


FIG. 73.—ROBINIA PSEUDACACIA DECAISNEANA

[To face p. 152

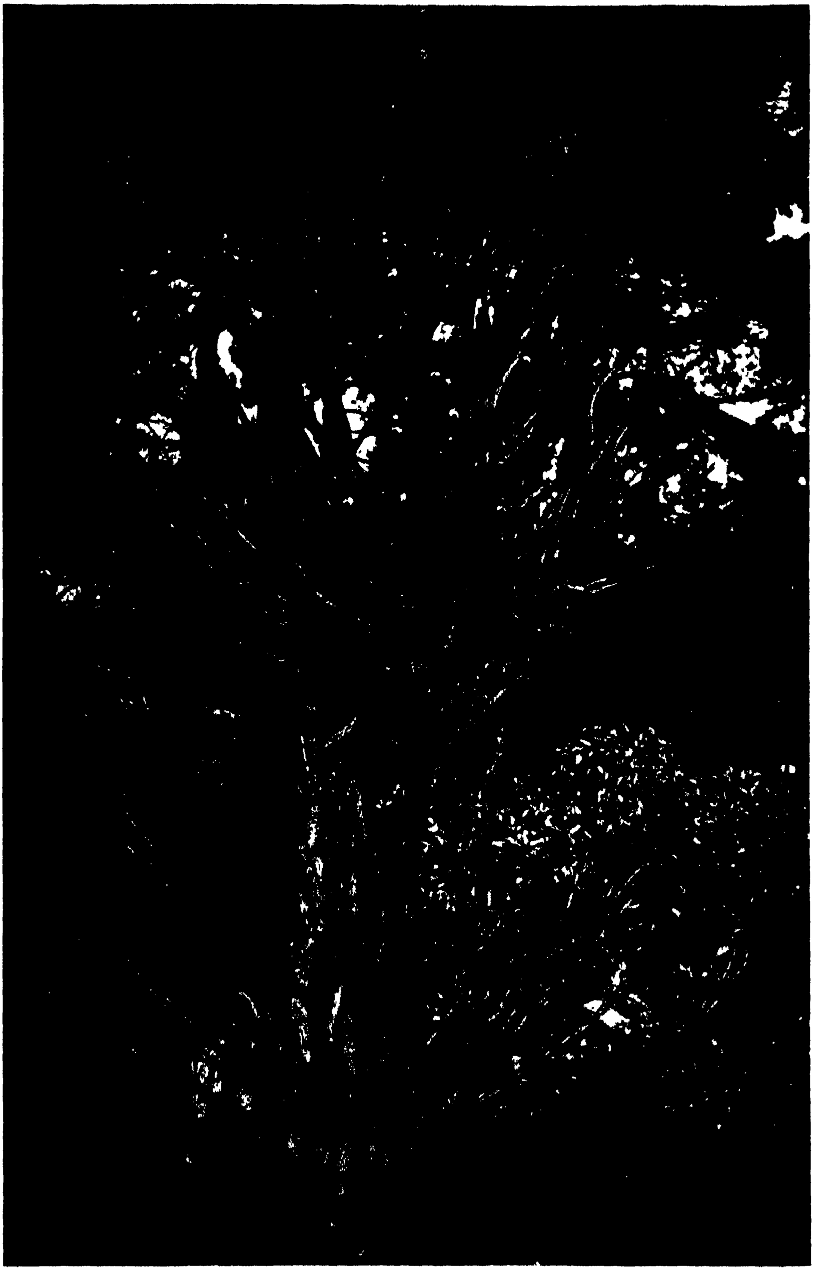


FIG. 74.—ROBINIA PSEUDACACIA INERMIS FASTIGIATA.
A rare and curious form of the common Mop-headed Acacia.

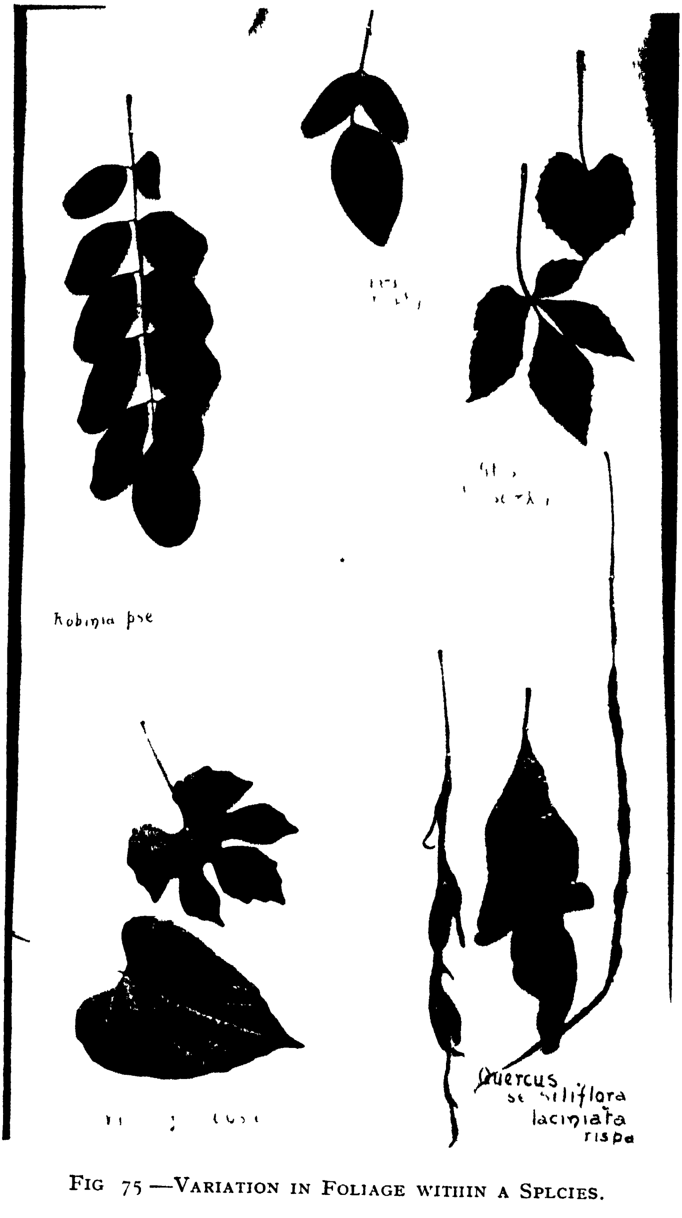


Fig 75 —Variation in Foliage within a Species.

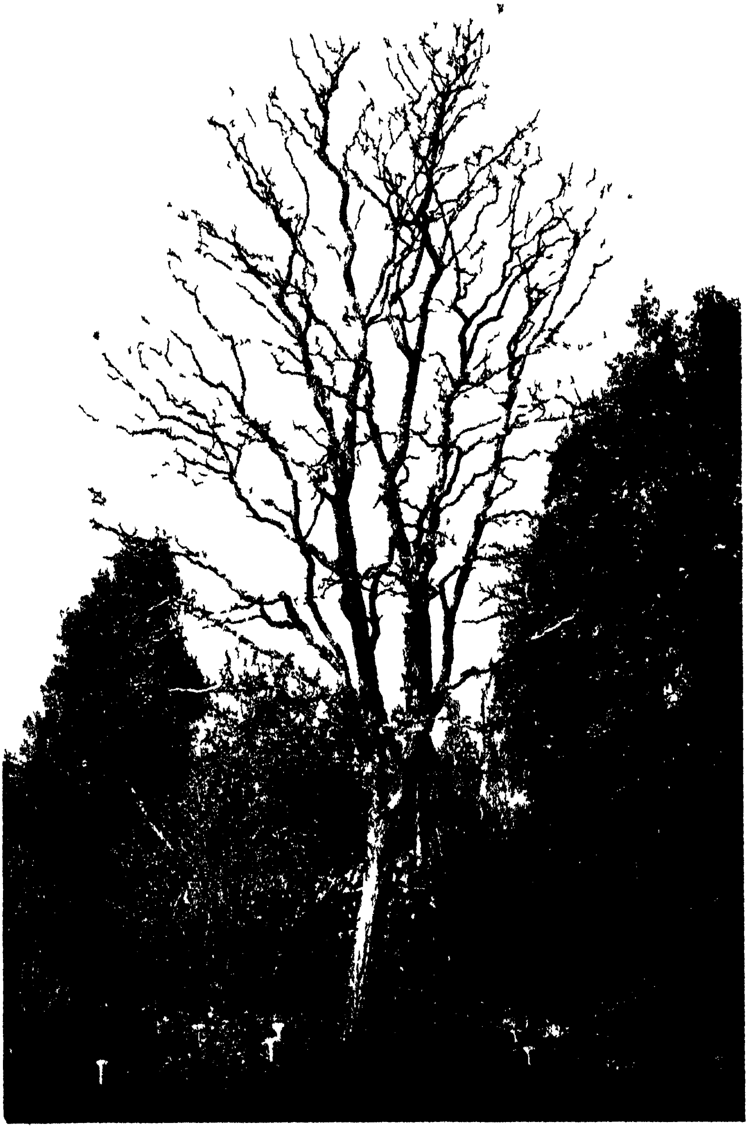


FIG 76—ROBINIA PSEUDACACIA TORTUOSA
A variety with curiously twisted branches

[To face p 153

the variety *monophylla*, that is to say the leaflets are about 5 instead of about 20 and are larger than those of the type, whilst they are 5 instead of 1 or at most 3, and are smaller than is the case with *monophylla*. The Kew specimen is 35 feet high and has a girth of 2 feet 8 inches, while the much younger one at Aldenham only reaches 18 feet and has a girth of 14 inches and a spread of 12 feet.

R. Ps. bullata is again a foliage variant, the tiny leaflets being crowded and swollen and the twigs small and thin. Though BEAN does not consider it worthy of mention in his book and it is not to be seen at Aldenham, there is a fair plant at Kew 29 feet high and girthing 2 feet 10 inches. My feeling about these Robinia leaf variants is the same as the one expressed by the well-known Lutheran pastor, STOCKER, about the Jews in Berlin, viz. that there are too many of them, and I may add that they lack distinction.

R. Ps. coluteoides syn. *sophoraefolia* is another of the varieties with tiny foliage, fully dealt with later on under *R. Ps. mimosaefolia* (which see). It is smaller in all its parts than the type. There is a tree at Aldenham, grafted 6 feet above ground, which is 16 feet high with a girth of 20 inches and a small spread of 9 feet; a much taller one at Kew, acquired in 1903, has a height of 36 feet and a girth of 3 feet 3 inches.

R. Ps. crispa. Here once more is a variety with abnormal leaves, that is to say that the leaflets are curled and twisted; although the distinction from type exists it is not nearly so pronounced or obvious to the casual observer as in the case of the Elm, which bears the same varietal name. This plant carries no spines on the branches. The Kew tree bought in 1885 is now 35 feet high and girths 2 feet 10 inches. For once in a way my plant, though at least ten years younger, has surpassed it already in height, having reached 40 feet, though with a somewhat slenderer girth of 2 feet 4 inches.

R. Ps. Decaisneana if not the best of the Robinias is certainly high up in the scale of ornament. In general effect, to the untrained eye at any rate, it closely resembles *R. luxurians*, and last summer when our biggest tree was covered from head to foot with a mantle of bright pink racemes standing out from the delicate foliage, and only separated from one another by a few inches, it aroused enthusiastic admiration in all observers. Even BEAN, who does not fling about superlatives with the freedom of the late REGINALD FARRER, calls it curtly but decisively "very handsome." It only differs from the type in the colour of the flowers and the fact that they are slightly larger. This sport first occurred in a French nursery in the Basses Alpes and flowered for the first time in 1862. It is fairly well known, but is not to be seen as often as it ought in English gardens. Kew got it in 1887, and the height of this plant is now 48 feet with a girth of 5 feet 8 inches; they have also another specimen ten years younger which reaches 41 feet and has a girth of 3 feet 4 inches. The Aldenham plant was obtained about 1900 and is now 30 feet high and girths 2 feet 7 inches with a spread of branches 15 feet across (fig. 73). So far it has been lucky enough to escape any material wind damage. Kew also have a further development of this variety to which a fourth name *rubra* is attached, and this which was acquired in 1894 is 35 feet high and has a girth of 2 feet 6 inches. I do not grow this, nor do I happen to have seen it at Kew when in flower; I should expect to find the colour of a somewhat deeper red than the normal.

R. Ps. Fabreana has leaflets up to 2 inches long by 1 inch wide. It is not grown at Aldenham, but Kew obtained a plant in 1895 which has thriven, and now reaches 45 feet in height and has a girth of 4 feet. See under *R. Ps. mimosaefolia* as to these trifling and rather unimpressive leaf variants.

R. Ps. fastigiata is a narrow columnar variety with the branches rising vertically round the trunk, as is the case with the form of the black Poplar, usually called 'Lombardy.' Indeed, this is a kind of growth which occurs more or less frequently in almost every genus, much more often indeed than most people realize. For instance, one finds, as will appear in the course of this paper, three distinct fastigiate trees without going outside this genus; and at Aldenham alone, having made no systematic investigation, I can recall off-hand more than twenty different fastigiate trees of which some of the least usual are a Beech, a Lime or Linden, a Tulip tree, a Spanish Chestnut, a Douglas Fir, and a Scots Pine. The only really common tree which I have never seen to take on a fastigiate shape is the Ash. Even as to this, however, Mr. RICHARD TROTTER tells me that there is one of fastigiate habit growing in a field on his land on Leith Hill, near Ockley, Surrey. ELWES writing in 1912 of the specimen of this variety at Kew, under the synonym of *R. Ps. pyramidalis*, records its height as 35 feet; in the thirteen or fourteen years which have since elapsed it has put on another 20 feet in height and is now 3 feet 3 inches in girth. It is the second tallest member of the genus that they own, and is certainly one of the many notable plants in our National Collection. After this the two very youthful ones at Aldenham, not more than ten years in age and about 12 and 10 feet in height, respectively, are a very small affair indeed.

R. Ps. glaucescens was secured by Kew from SPÄTH in 1903, and I have never seen it anywhere else. It has not grown so freely as some of the other varieties. It is now 20 feet high and has a girth of 14 inches. Mr. BEAN states that he is not able to give exact particulars as to flowers, but so far as he knows they do not differ from those of the type. He presumes its chief characteristic to consist in its slightly glaucous hue, SPÄTH's catalogue detailed it as a "Small tree; somewhat frilled, bluish leaves."

R. Ps. Gondouinii came to Kew two years later than the last-mentioned, and from the same source. Whatever value it has is mainly attributable to its rarity. Neither it nor the preceding is at Aldenham. Its height is 27 feet and its girth 19 inches.

R. Ps. inermis. Unlike many of the Pseudacacia varieties this at any rate is absolutely distinct in outward appearance. It has no spines, and for all practical purposes no flowers, it is usually grafted on a standard of the type, about 10 feet high, and forms a solid compact neat cannon-ball head, almost completely spherical and needing no pruning to preserve its symmetry. It is eminently suited for, and largely employed in, small villa gardens, and can be used effectively in bigger ones to form a little avenue or single row along the grass verge of a terrace, in the same fashion that one used to see standard roses planted in the days of my youth. The Kew tree bought in 1897 is 20 feet high with a girth of 2 feet 10 inches. The Aldenham one, about 10 years younger, is 15 feet high and has a girth of 1 feet 8 inches and a large head 9 feet across. *R. Ps. in. latifolia* only differs from the preceding in having larger leaflets. It is not grown at Aldenham, but the fine Kew plant thereof, acquired as far back as 1889, is now 24 feet high and has a girth of 2 feet. *R. Ps. in. fastigiata* (fig. 74) and *R. Ps. in. pendula*, on the other hand, are to be found at Aldenham, but not at Kew. The former is not nearly so narrow as *R. Ps. fastigiata*, but shows no other difference except the absence of spines. It is 12 feet high and 9 feet across. The latter is a much more open grower than the usual mop-headed *R. Ps. inermis*, but its pendulous characteristics are not very obvious at first sight, being confined to the small thin twigs which grow straight downwards, and not affecting the general construction of the head. Our plant is about twenty years old, has a height of 18 feet, a girth of 20 inches, and a spread of 12 feet.

R. Ps. lutea is mentioned in old books as having yellow flowers; BEAN is sceptical as to its ever having existed, but if it did and could be recovered it would be as great a find botanically as would be the lost books of LIVY historically.

R. Ps. mimosaefolia is another of the forms with tiny leaflets such as *Ps. amorphaefolia*, and *Ps. angustifolia*. It is not mentioned by ELWES or BEAN, though the former also catalogues as of the same type vars. *myrtifolia* (syn. *angustifolia*), *tragacanthoides*, *linearis*, and *dissecta*, none of which have I seen, nor do I feel any burning desire for a sight of them. To tell the truth these leaf sports which often occur in nurseries are usually very much alike, and no one in his senses, even if he were the Director of a Botanic Garden, would want all or even more than one or two of them. But to return, after this outburst, to *mimosaefolia*, it is grown at Kew, where they have a tree 18 feet tall with a girth of 14 inches, and at Aldenham there are two good plants 24 feet high with a girth of 20 inches and a spread of 14 feet. Though a very shy flowerer (I cannot be sure that it has ever flowered at all), it is worth growing for the extreme delicacy and minuteness of the foliage, and I find that it is often noticed and commented on admiringly even by those not much given to noticing trees.

R. Ps. monophylla. I imagine if anyone, not a botanist, were asked to say what was the characteristic feature of the genus Robinia, he would reply, "the delicate foliage composed of numerous small leaflets"; and it illustrates the untrustworthiness of leaves as a guide to the nature of a tree that this feature should be almost entirely absent in the variety now under discussion. Though it be a little outside the province of this paper, I have been tempted to have a plate photographed which contrasts not only leaves taken from the type of *R. Pseudacacia* and from this variety, but also from the same plant of *Vitis flexuosa*, two from *Vitis Piasezkii*, and three from a variety of our common Oak. Those correspondents of mine who have in vain applied to me for the identification of a shrub or tree of which they have sent but one rather crumpled leaf will, I hope, take a more lenient view of my incompetence when they realize from a study of the accompanying plate how completely different specimens of foliage taken from the same plant may be (fig. 75). In the case of the variety *monophylla*, as its name imports, a number of little leaflets, sometimes over twenty, are found converted into one large one, though occasionally into two or three. This form first occurred in the Deniaux Nursery in the year 1855, and probably reached England not many years later. Though often used in ornamental planting in the parks and tea gardens of Germany, it never seems to have become popular or to have attracted much notice in this country. Kew did not acquire an example till 1899, and this is now 47 feet high and has a girth at 3 feet of 2 feet 11 inches. My own plant is aged about twenty-five or thirty and having lately become unhealthy has lost a large portion of its growth, it is now only 20 feet high with a fair girth of 2 feet 3 inches. Kew also possess two forms of this, viz. *R. Ps. mon. fastigiata*, a fine tall narrow form with upright branches 50 feet high and girthing 4 feet 8 inches (of this Aldenham has a young tree about 10 feet high); and *R. Ps. mon. pendula*, with weeping boughs, 35 feet high with a girth of 3 feet 5 inches. When Mr. ELWES saw them in 1912 he spoke of them as "both about 30 feet high." If he was right their rate of progress since has been very different. Both were bought in 1894. Unfortunately, the second is not now represented in the Aldenham collection, though the catalogue shows that at one time we had a plant.

R. Ps. pendula nova. This is an old variety not at Aldenham and rarely seen outside Kew, where it was planted long ago. The branches are indeed somewhat pendulous, but not at all to the degree that occurs in other weeping trees. It cannot be said to possess any startling merits. It stands 31 feet high and has a girth of 2 feet 8 inches at 3 feet above ground.

R. Ps. Rehderi is a shrubby variety of rather upright growth and without spines. The old plant at Kew is now 20 feet high. We had it at Aldenham at one time, but apparently lost it, and if I wanted to replace it I should have no idea where to go to get one.

R. Ps. robusta Vignei is one of the almost countless forms showing leaf variety, with little leaflets under ¾ inch long and under ⅜ inch wide; the habit is dense and wide. I have seen it nowhere except at Kew, where there is an old tree 40 feet high with a girth of 4 feet 8 inches. See under *R. Ps. mimosaefolia* for fuller remarks on nurserymen's forms of this sort.

R. Ps. Rosynskiana has long pendulous leaves with a few abnormally large leaflets. The description in SPÄTH's catalogue is, roughly translated, as follows: "The horizontal or overhanging branches are furnished with underhanging pinnate leaves, measuring up to 50 cm. in length. These are corrugated with small leaflets. Beautiful as a single tree, which is very ornamental." At Aldenham there is a specimen about 16 feet high with a girth of 2 feet, which was heavily cut back when it was moved to a new position about four years ago. Kew also had one, but lost it.

R. Ps. semperflorens. This is a very vigorous variety which is said to bear flowers continuously from June to September. It originated in a French nursery a few years before 1875, when it was put on the market. It has, however, never become common in England, and is not to be seen at Aldenham or even at Kew, though owing to its long flowering period it may be worth growing.

R. Ps. tortuosa (fig. 76). This is one of those natural freaks with all the boughs twisted and contorted in corkscrew style, though not in quite so pronounced a manner as occurs in a variety both of our native Thorn and Hazel; indeed, the last is so deformed as in the opinion of my friend, Mr. A. BOWLES, to deserve relegation to a Vegetable Chamber of Horrors! In spite of its deformity, *R. Ps. tortuosa* forms a broad shapely head, but the malformation of the wood seems to have affected the flowering power, for the racemes when they occur are but sparsely furnished. At Aldenham there is a well-grown tree about thirty years old, 24 feet high with a girth of 2 feet 1 inch and a spread of branches 20 feet across. The two much older specimens at Kew are respectively 45 feet high with a girth of 5 feet 2 inches, and 39 feet high with a girth of 6 feet.

R. Ps. umbraculifera. This is a mop-headed variety in the same style as *inermis*, indeed if there be any distinction between the two I have not been able to discover it.

R. viscosa, the 'Clammy Locust,' gets its specific name from the sticky exudations which proceed from the glands on the twigs. Its original home is North and South Carolina, but it has been largely planted all through the Eastern States. It first arrived in England in 1797, but has never become popular, though in my judgment it is well worth growing. Dr. HENRY speaks of it as a much slower grower than *R. Pseudacacia*, but, though certainly not over thirty years old, it has done remarkably well at Aldenham, there it is already 32 feet high, has a girth of 28 inches, and a spread of 20 feet (fig. 77). Moreover, though I have the dread of the jealous Gods before me when I record the fact, it has so far entirely escaped all injury from gales, including the one which three years ago entirely wrecked a neighbouring specimen of *R. luxurians*. The flowers in my experience are not quite so freely produced as in the case of the other species, but they are very attractive; both HENRY and BEAN gave the colour as pale pink with a pale yellow splash on the inner surface of the standard; of course they are right, but I should have said, speaking from memory (but a frail staff for an old man to lean on), that the flowers produce a rich cream-coloured effect and have a thick fleshy look very distinct from the thin pure papery-white of the bloom of *R. Pseudacacia*. It may be, of course, that my specimen varies from the type known to HENRY and BEAN by the pink colouring being so faint as to escape notice. REHDER says the flowers are "pink with yellow blotch on standard," whilst my friend, Professor SARGENT, of the Arnold Arboretum, Massachussets, in his turn described the colouring as "pale rose or flesh colour." (Since writing these notes my friend has departed from amongst us, and we mourn this great loss to horticulture.—V. G.)

The flowers lack the sweet smell of the common so-called Acacia, and are at their best towards the end of June, a week or so later than is the case with other Robinias. Kew has three fine old trees, probably, according to Dr. HENRY, "the finest in Europe," their measurements are 33 feet, 28 feet, 28 feet, with girths, respectively, of 4 feet 2 inches, 4 feet 3 inches, and 4 feet 9 inches, at 3 feet above ground. The maximum height which the tree is supposed to attain is only 40 feet. It will be noted that though these are old trees and mine is a young one, the latter only falls short of the tallest Kew plant by 1 foot, though its girth is only about half as big. Considering how rarely this tree is to be seen at all outside Kew, it must be regarded as a notable specimen.

I cannot conclude this review of the genus Robinia without a remark which might almost be stereotyped for any tree-article of mine, namely an expression of gratitude to Mr. W. J. BEAN, the well-known curator of Kew, for the valuable help which he has rendered me by suggestion and correction; also my grateful thanks are due to Mrs. R. MALBY for the excellent photographs she has so kindly prepared for me, with her usual artistic skill, which renders her one of the foremost camera-artists for outdoor work in the country.

NOTES ON JAPANESE CHERRIES.—II.*

By COLLINGWOOD INGRAM.

A CERTAIN Japanese diplomat is said to have made this apt remark: "When we were the most artistic and aesthetic race in the world we were called barbarians. Now that we have become a Power, and have acquired the means of killing our fellow men, we are called a civilized people." For my part I deeply regret the passing of the old "Barbarian" days. The inherent courtesy of this Eastern race, their extraordinary charm, and the exotic picturesqueness of their homes, were still apparent when I first visited Japan nearly a quarter of a century ago. Perhaps a little—a very little—of this charm lingers to this day, but, as Sir FREDERICK TREVES has expressed it, civilization has now fallen upon the country like a disfiguring disease. Commerce and militarism are to-day paramount in the people's thoughts, and the delightful old-world feudalism of the previous generation is but a faded memory. Nowadays only such arts and crafts as can be exploited on commercial lines are still flourishing. And so it is with horticulture. True, the rustic folk still love their dwarfed plants, their garden Azaleas, and their ancient temple trees, and they still flock in thousands to see a floral display, but the old horticulturists—the men who produced with such painstaking care the countless varieties of flowering Cherries, Plums,† and Peaches—these have all gone.

Gone, too, are many of their precious plants. For instance, the Leontodons (Dandelions) were formerly favourite pot plants with the Japanese, and there is documentary evidence to show that there were many beautiful forms of them, ranging in colour from white to rich copper-red, in common cultivation during the Tokugawa Shogunate. To-day there is not one left. Happily Cherries, by comparison, are long-lived, or they would have suffered a like fate. The people still appreciate the beauty of the Cherry, and many thousands are probably planted every year, but no interest seems to be taken in the rarer varieties and some of them are now on the verge of extinction. Tai Haku (the largest and most beautiful of the single whites) and Daikoku (a very handsome double pink) have, apparently, already disappeared from their native country, but are fortunately still in cultivation here. Others, like the famous Fuji-mi tree in the Koganei Avenue, are represented by only a single specimen. Some are in a sad state of decrepitude, and their kind will assuredly be lost to posterity unless immediate steps are taken to perpetuate them.

---

* For the former article on this subject, see this JOURNAL, vol. 50, p. 73.

† I have seen a collection of paintings depicting no fewer than 128 distinct varieties of *Prunus Mume*.

In Tokyo a Cherry Society—called the Sakura-no-Kwai—has recently been formed, so something may yet be done. This Society is fortunate in having a distinguished scientist, Prince TAKA TSUKASA, as its President and equally so in having Mr. A. HAYASHI as its capable and energetic Secretary. The latter appreciates the importance of getting together a representative collection of Cherries before it is too late, but without financial support from the Government the task is going to be an extremely difficult one, for at present he has to depend entirely upon the slender funds of the youthful Society.

The best known, and certainly the most important, collection of ornamental varieties in Japan is at Kohoku, on the banks of the Arakawa, a few miles out of Tokyo. This avenue was planted by one KENGO SHIMIDSU more than forty years ago, and is already on the downward grade. It formerly contained as many as seventy-eight varieties, but a portion of the avenue has been destroyed to make a new river embankment and some of the trees have recently died, so that the original number is much reduced. But the thanks of all Cherry lovers must be given to KENGO SHIMIDSU. Had it not been for the enterprise of this obscure suburban magistrate, many of the most beautiful forms would have undoubtedly been lost to the world.

And there is another inhabitant of Kohoku we must not forget—Mr. S. FUNATSU. No one has a greater knowledge of the Cherries of Japan than this venerable old gentleman. He loves and knows them as he does his own children. Every spring he basks in their beauty, and spends much of his time under the flower-laden boughs of the Arakawa Avenue. He is the recognized authority: there is no one who can dispute his decision, for he is the fountain head of Cherry lore.

The equally famous avenue at Koganei (fig. 78) is perhaps even more imposing, for it is three miles long, and composed of much larger and older trees—in fact the majority were planted as long ago as 1736. But, whereas the Kohoku Cherries are all cultivated varieties, those of Koganei belong to the wild species, *Prunus mutabilis*, with single white flowers. Here may be found some of the finest specimens in the country—broad-crowned trees from 40 to 50 feet high. The same species forms the extensive groves at Yoshino and Arashiyama (fig. 79) in the vicinity of Kyoto.

Professor MIYOSHI, in "Die Japanischen Bergkirschen, ihre Wildformen und Kulturrassen" (1916) and subsequently in the *Tokyo Botanical Magazine* (1920 and 1922), has described 185 varieties of the wild and garden Cherries. Although these lists include many trivial forms that might, with advantage, have been omitted, there are still a large number of quite distinct varieties that have escaped his notice. In temple grounds, by Shinto shrines, and in small, out-of-the-way villages I have found Cherries growing that were apparently unknown to this writer. A few of these I have been able to introduce into England, and some are described in the following

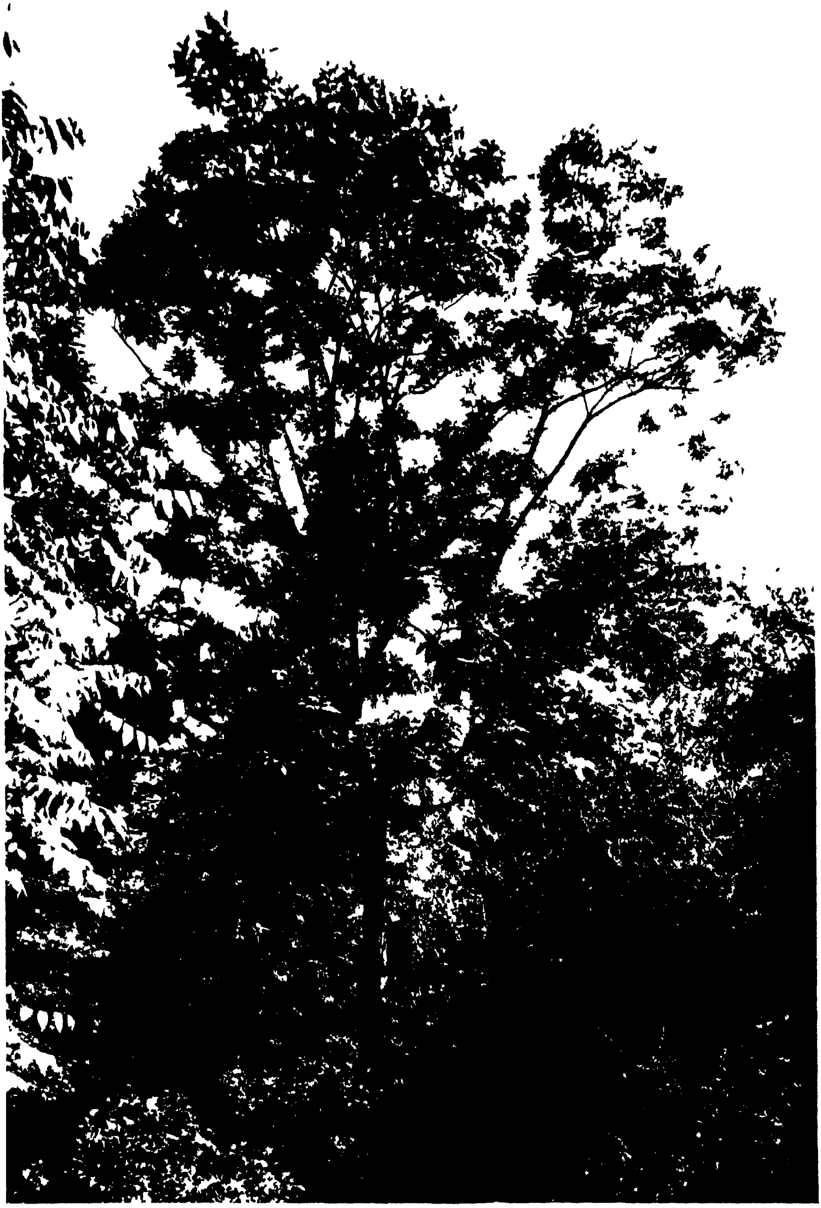


FIG. 77.—ROBINIA VISCOSA

[*To face p.* 160.

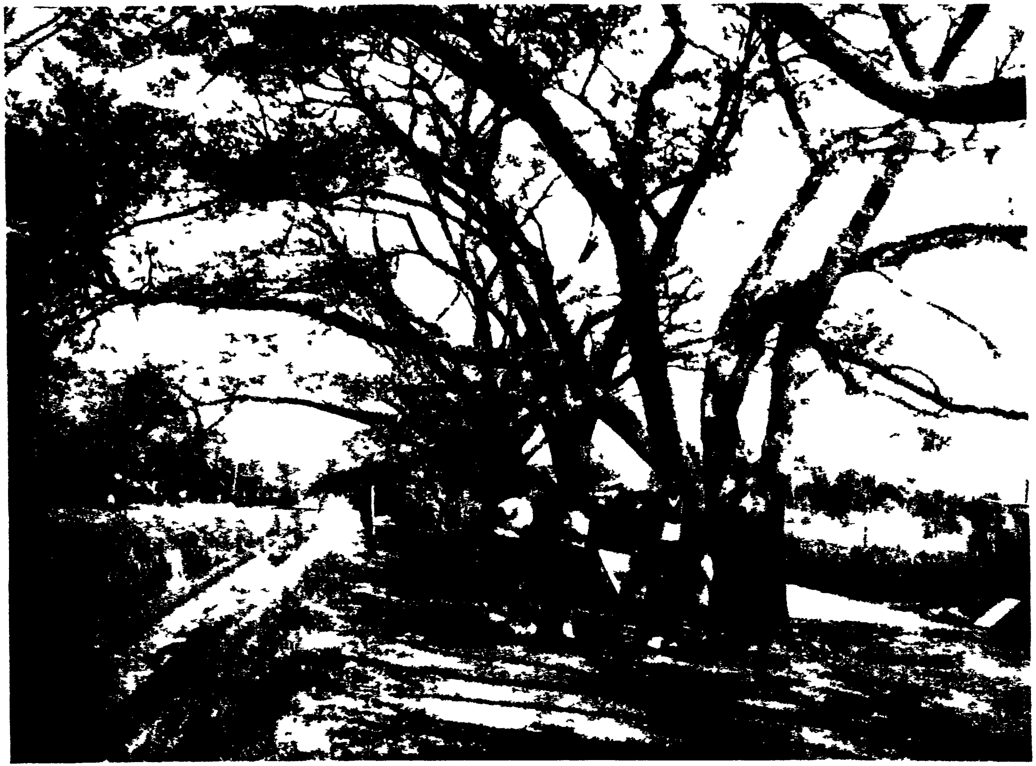


Fig 78—The Koganei Avenue near Tokyo

pages, but there are many more that I have not succeeded in getting. Perhaps my most interesting discoveries were among the Spring Cherries—the *Prunus subhirtella* group. For instance, in the grounds of the Kiyomidzu temple at Kyoto, I saw a large-flowered semi-double form of this tree that was quite new to me, while near the Hiean-jingu, in the same city, I discovered a still more beautiful variety. This Cherry I again met with near Sendai in Northern Japan, whence, I believe, it originated. It has a weeping habit and its double-flowers are of a rich pink hue, very deep coloured in the bud. I was also fortunate in finding several new ' Serrulata ' Cherries, the most beautiful of which was the variety I have named Asano (*P. s. Geraldinae*)–see p. 168.

In attempting to create order out of the chaotic confusion of Cherry names that exist in Japan and Europe, I find I have set myself an almost impossible task. Some of the varieties are quite distinct and easy enough to determine, but there are many more that are intermediate, or mere variants, and these seem to have no fixed names. But my greatest difficulty is the pernicious practice in vogue among European and American nurserymen of inventing their own names. If they would only realize that this intentional, or unintentional, mystification of their clients is seriously retarding the popularity of these beautiful trees, they would perhaps desist. If a man does not know what he is going to get, it is pretty certain that he will not place an order. It is very discouraging to buy the same plant, as I have done, under a dozen different names. Perhaps it is only fair to say that the Western nurserymen are not alone in this practice ; the Japanese themselves are often equally to blame.

When I was in Kyoto I had occasion to remark on the peculiar nomenclature used in that city. My companion promptly reminded me that Kyoto was the ancient capital of Japan, and added that he could see no reason why the inhabitants of that place should adopt the names used in Tokyo. *Que voulez-vous !*

In this paper I am, as heretofore, using *Prunus serrulata* as the designation of all the Japanese Garden Cherries, and am discarding its use for the spontaneous species. In this classification I follow MIYOSHI'S example. It cannot be denied that the parentage of LINDLEY'S original *P. serrulata*, introduced into England from Canton in 1822, is very obscure and only a bold botanist can point confidently to its prototype. To apply the name to a wild Cherry implies relationship. It was almost certainly evolved from one of the many Chinese species described by KOEHNE in 1912 (cf. *Plantae Wilsonianae*, Part II), but to which of these I am not prepared to say. WILSON has made the problem very simple for himself by lumping several of the species together and associating them with the Japanese Hill Cherry (*P. mutabilis*) under the one name, *P. serrulata spontanea*. Unfortunately, this classification cannot stand. Anyone who has compared the living plants growing side by side must, I think, admit the specific rank of at least *P. tenuiflora* Koehne, *P. mutabilis* Miyoshi, and *P. hupehensis* Ingram (*Gard. Chron.*, 1928).* WILSON also regards *P. sachalinensis*, Fr. Schmidt—a distinct northern species—as a variety of *P. serrulata*, and assumes that this is the parent of a number of the garden forms such as Kanzan, Fugenzo, Benden, and Udzu-Zakura. With this opinion MIYOSHI, with good reason, does not concur. He informed me that most of the ornamental varieties were produced in the immediate vicinity of Kyoto, which was the artistic centre of Japan during the Tokugawa Period, when the cultivation of these Cherries was at its zenith. Being a northern species, *P. sachalinensis* apparently will not tolerate the warm climate of the lowlands of South-west Hondo, and was consequently not available as a selective plant. But, quite apart from this very pertinent argument, *P. sachalinensis* differs very markedly from the above-mentioned garden forms in its characteristic foliage, bark, and inflorescence; the latter being usually devoid of any visible peduncle, whereas it is conspicuously long in the others.

When I was in Japan I was shown a photograph of a reputed pink-flowered wild Cherry from Korea, seeds of which subsequently reached me.† The resultant plants have not yet blossomed, but the foliage certainly suggests kinship to some of the ornamental varieties. Let us hope we have at last discovered the mysterious parent of these beautiful trees.

Shirotae, Kojima, and Jonioi all belong to a different class, and are almost certainly descendants of the Oshima-Zakura, *P. speciosa* Koidzumi, but, for convenience' sake, in the meantime I am grouping them with the other garden forms.

In my last article I maintained that *P. Avium* was an excellent stock for Japanese Cherries in this country. With one or two possible exceptions (which are mentioned later) I have had no reason to change this opinion. Indeed, I think there are to be found better and healthier specimens of some of the varieties growing on this stock in England than in Japan, where its use is unknown.

When I was in Tokyo I was asked by the Secretary of the Cherry Society to deliver a lecture to the members of the Sakura-no-Kwai. As I loathe public speaking and, moreover, regarded it as an impertinence for a foreigner to address a Japanese audience on their national tree, I was very diffident about accepting. But there was no escape; all arrangements had been made. My only solace was that probably not more than three per cent. of those present could understand a word I said! Perhaps this was a pity, for a few home truths might have had a salutary effect and stimulated an interest in the rarer—and disappearing—varieties.

I drew attention to the unhealthy condition of the majority of the trees in their parks and other public places. I attributed this to three causes. Firstly, the use of a feeble, short-lived stock (Mazakura);

---

* The type specimen was raised from seed No. 349 WILSON. VEITCH Expedition, 1900.

† I am informed that these were collected at a place called Gyujido, at no great distance from Seoul

secondly, to the prevalent practice of transplanting trees that are too old; and, thirdly, to the use of a site that had, in all probability, been occupied for hundreds of years by previous Cherry trees.

The forms described in the following pages bring the total number of determined Japanese species and varieties cultivated in my garden up to fifty-nine—there remain many more that have not yet flowered, and are therefore still unidentified.

Japanese synonyms (or what I imagine to be synonyms) are shown in brackets. When it has been necessary to mention the same variety a second time, the reader has been referred to my previous article, published in this JOURNAL in 1925. The varieties that were not then described, have been given new consecutive numbers, but they have been placed, as far as possible, in accordance with their affinity to the previously described forms.

1. SARGENT'S CHERRY.

Prunus sachalinensis, Fr. Schmitt.

(See also JOURNAL R.H.S., **50**, p. 78, No. 1.)

Until a few years ago there stood in the famous Koganei Avenue, near Tokyo, a very tall and perfect specimen of a Cherry tree—one, presumably, of the 10,000 that were planted there by order of the Shogun YOSHIMUNE in 1735. WILSON photographed this example and figured it in his "Cherries of Japan" (pl. vi) as *Prunus serrulata* var. *sachalinensis*, Apparently MIYOSHI was also impressed by the beauty of this specimen, for he likewise selected it for an illustration, but he assigned it to a different species and called it *Prunus mutabilis f. dilucularis* in his "Japanische Bergkirschen" (pl. ii.) Which of these authors are we to follow? Having seen the tree (unfortunately no longer perfect owing to the loss of a central limb) I unhesitatingly endorse MIYOSHI's identification, the flowers and foliage being quite distinct from those of *P. sachalinensis* as I understand the species. Moreover the latter Cherry has a more northerly or alpine distribution than *P. mutabilis*, and does not prosper in the immediate vicinity of Tokyo. I think I am right in saying that there is not a single specimen of SARGENT's Cherry in the whole of the Koganei Avenue. It grows wild at 3,000 feet in the mountains near Lake Shoji, but this appears to be near the southern limit of its range.

It would be difficult to conceive a more beautiful tree than this, be it in the spring, when every bough is smothered in soft pink blossom, or in the fall of the year, when it has donned its autumn garb of fiery scarlet.

SARGENT's Cherry was not introduced into this country until about thirty years ago, and is therefore still rather rare in collections. In Japan it likes a cool and rainy climate, a woodland soil, and a sharp hillside drainage—in fact, ideal conditions for almost any temperate tree. I fancy it will not tolerate a hot and hungry soil; nor will it stand a too wet and lifeless clay, as I have discovered to my cost; but if these extremes are avoided, it ought to thrive in most parts of England. There can be no question about its hardiness.

2. SHIRO-YAMAZAKURA. THE HILL CHERRY.

Prunus mutabilis, Miyoshi.

(See also JOURNAL R.H.S., **50**, p. 79, No. 2.)

This is the species most commonly cultivated in the vicinity of Kyoto, and the famous groves at Arashiyama and Yoshino * are almost entirely composed of this Cherry. In and near the new capital, *P. yedoensis* is now a greater favourite, but that the Hill Cherry was formerly extensively planted there is proved by the many superb specimens to be seen in the great avenue at Koganei and at Sakuragawa—both of which places are in the immediate neighbourhood of Tokyo.

There are, I feel sure, at least two species growing in these collections. In the commonest, and most beautiful, tree the foliage is of various shades of reddish-bronze when young, and more or less entirely glabrous. This is the typical *P. mutabilis* of Central Japan. Here and there one comes across a plant with greener immature leaves and more pubescent foliage, which opens its flowers a week or so later. There are also other, but less obvious, differences to be noticed among these late flowering specimens. MIYOSHI separated two, calling them *P. media* and *P. sacra* (cf. *Tokyo Bot. Mag.*, vol. xxiv., pp. 167 and 168), but WILSON has lumped them all together under the name *P. serrulata* var. *pubescens*. If, as appears likely, this pubescent Cherry is a true species it is no doubt segregated in nature. Bearing on this point, it is perhaps worthy of note that I observed in the wooded hills near Lake Biwa a number of these "green-leaved," late-flowering Cherries growing where there were no typical *P. mutabilis* in view. In the Motosu Lake district of Yamanashi Ken I met with another white-flowered Cherry that was apparently distinct. It had green immature foliage and glabrous parts. Later on I encountered yet another easily distinguishable form near Mount Aso-san, in the southern island of Kyushu. From these observations I am confident there is still a large field for research among the native Cherries of Japan; but the botanist who aspires to work them out will have to seek the living plants; he will do no good with herbarium material alone.

P. mutabilis, the typical wild Cherry of Japan, is for some inexplicable reason still extremely rare in English gardens. This cannot be attributed to its want of beauty, for in its best forms it is a really lovely tree, not only in the spring, when its snow-white flowers mingle with the copper-red of the young foliage, but also in the autumn, when its leaves colour to vivid shades of crimson.

---

* Elsewhere I have described Yoshino and the amazing throng of sightseers that daily visit these famous groves during the Cherry season (cf. *Gard. Chron.*, October 23, 1926).

I have never seen a full-sized specimen in this country, and no attempt has yet been made, even in Japan, to select the finest forms of this very variable species. Although the Hill Cherry does not like a bleak climate or an unkindly soil, under favourable conditions it should thrive in most parts of England. It is a long-lived tree, ultimately attaining a height of 50 feet or more with a broad, spreading crown. Unfortunately young plants do not flower very freely, but old trees are always smothered in blossom.

38. TAO YOMA ZAKURA.

Prunus serrulata taoyoma, Ingram n. comb.

I found this variety growing in the precincts of the Hirano Shrine at Kioto. The young leaves are dark, almost purplish-brown when they unfold. The flowers are only of moderate size, pinkish in the bud, fading to white when fully open. They are usually single with an inner ring of petaloid stamens. Calyx, cupula, and pedicel, vinous-brown. It is a fairly distinct variety of mediocre garden value.

39. CHOSHU-HISAKURA.

Prunus serrulata splendens, Miyoshi.

(BENDEN.)

In Japan this variety is often called Hisakura alone, the prefix merely denoting the southern province from which it is supposed to have originated. In England, of course, this name has been persistently misapplied to the double form Kanzan. The real Hisakura is a *single*, pink-flowered Cherry, and therefore quite distinct from the plant that has wrongfully appropriated its name. In foliage the two plants are not unlike, for those of Hisakura are also of a beautiful reddish-copper colour when young. The rose-pink flowers measure about 4 cm. in diameter and are borne in loose corymbs of two, three, or four together. The calyx and cupula are tinted with purplish brown.

In general effect this variety resembles Yae-Murasaki-Zakura, but the flowers of Hisakura differ by being completely single. The latter also has a more vigorous constitution and consequently forms a larger and more open plant.

As with so many of these Ornamental Cherries, Choshu-Hisakura appears to have several sub-varieties. 'Benden' might be described as one of these, the chief difference being in the paler shade of its single pink flowers.

8. MURASAKI-ZAKURA.

Prunus serrulata purpurea, Miyoshi.

(See also JOURNAL R.H.S., **50**, p. 83, No. 8.)

(GIJO.)

Plants recently received from Japan under this name agree fairly well with my old Yae-Murasaki-Zakura, but appear to flower a little later. This variety has a peculiar habit of commencing the season with comparatively strong growths. Later on these shoots become suddenly arrested and a cluster of buds forms at the blunted branch tips. The following year these buds develop into large bouquets of mauve-pink flowers.

Specimens labelled 'Gijo,' imported from Japan at the same time, appear to be identical with those named 'Murasaki.' Unless my memory misleads me, there is some mistake here, for the true 'Gijo,' as I saw it growing in the fat black soil near Yokohama, is a distinct variety, the one which MIYOSHI calls *P. serrulata campanulata* in his monograph.

40. KOKONOYE-SAKURA.

Prunus serrulata homogena, Miyoshi.

I imported plants of this variety in 1927, and they first flowered with me towards the end of last April. The blossoms are of moderate size, semi-double, and of a uniform soft pink colour. The figure of this Cherry in MIYOSHI'S "Japanische Bergkirschen" (pl. xvi.) is a fairly accurate representation.

Young foliage bronze-green. Bracts distinctly bearded.

41. SUMIZOME.

(*Prunus serrulata subfusca*, Miyoshi) ?

WILSON gives a glowing account of this form: "Flowers single or nearly so, white flushed pink, fragrant, and very large. This is one of the most beautiful of all Japanese Cherries."

Thanks to the generosity of my friends, I was able to obtain scions of 'Sumizome' direct from the Arnold Arboretum, presumably from one of WILSON'S original trees. The resultant plants have now flowered with me. Beautiful they certainly are, but the blossom is neither single, nor is it white. The flowers are almost as pink as those of 'Hokusai,' and definitely double with twelve to fourteen petals. There must be some mistake here. As the Sumizome plants shown to me in Japan exactly resembled—so far as my memory serves—the variety received from the Arnold Arboretum, I am inclined to think that the error must lie in the description rather than in the identification. On the other hand it should be noted that MIYOSHI's description and figure also indicate a single, white-flowered form.

In my 'Sumizome,' the flowers are fragrant and of a uniform soft pink colour. They measure about 4·7 cm. in diameter. The young foliage is bronze-green.

The native name means "Inky Dye." When I told a Japanese friend that I could detect no inky hue in the flower, he seemed somewhat pained at my obtuseness. "Of course it's not in the *flower*. Look at the shadows cast on the ground—surely *they* suggest ink stains to your mind!"

11. DAIKOKU.

Prunus serrulata daikoku, Ingram.

(See also JOURNAL R.H.S., **50**, p. 85, No. 11.)

Three years ago I received some plants from an English nurseryman labelled 'Benifugen.' These proved to be very near, if not identical with, my Daikoku, the only difference being that they appear to blossom a little earlier, while the flowers are perhaps not quite so open in the centre. These varietal differences are, however, too slight to warrant separation. It may be noted that I did not meet with this handsome Cherry during my travels in Japan.

WILSON gives 'Benifugen' as a synonym of *P. s. fugenzo*, but my plants are quite distinct and must, therefore, bear a different name. It is a beautiful variety with strikingly large flowers of a good pink colour. With me it has not proved a very free bloomer and cannot, therefore, be regarded as one of the showy sorts.

42. UDZU-ZAKURA.

Prunus serrulata spiralis, Miyoshi.

This Cherry is very near, or identical with, my Hokusai, but the plants I have received under this name from America and Japan are more upright, and at present show no tendency to produce the broad, almost flattened crown so characteristic of the latter. There are, as a matter of fact, several forms in cultivation very closely related to my plant. These differ more in their vigour and habit than in their inflorescence and foliage, and are therefore indistinguishable in the herbarium. Curiously enough they are not very frequently grown in their native country, but are deservedly popular in this.

'Hokusai' (with which, perhaps, we may bracket 'Udzu-Zakura') is certainly one of the very best Cherries for our climate. It is very beautiful, has an excellent constitution, and is long-lived. The flowers of Kanzan are more richly coloured, but they are not produced with quite the same lavish extravagance.

The prefix "Udzu" means eddy or whirlpool. I can offer no suggestion for this name, nor for its varietal one of *spiralis*. In my previous paper I stated that the Cherry called Yedo-Zakura (*Prunus serrulata nobilis*) was nearly related to 'Hokusai.' This is a mistake. The two varieties are quite distinct, the latter having more double flowers and different foliage.

13. OJOCHIN.

Prunus serrulata ojochin, Ingram n. comb.

(See also JOURNAL R.H.S., **50**, p. 86, No. 13.)

The 'Ojochin' of MIYOSHI is not the same as the plant that was pointed out to me as such in Japan. This proved to be the variety I described as 'Senriko' in my last paper; a large (usually) single Cherry, with gross and somewhat leathery leaves. The name 'Ojochin' (meaning "Large Lantern") has been misapplied so often in this country and in Japan that its rightful owner is difficult to trace. Here it has frequently been used for one of the forms of 'Hokusai,' but I feel confident that this is an error. Assuming that my Japanese informants were correct in their identification, my 'Senriko' (cf. JOURNAL R.H.S., **50**, p. 86) must therefore become 'Ojochin.' The real 'Senriko' remains unknown to me.

The variety under discussion is a coarse, strong grower, and therefore not one of my favourites, but the pinkish-white flowers are large, and the tree is undeniably handsome when in bloom.

43. ASANO.

Prunus serrulata Geraldinae, Ingram.

On May 4, 1926, I entered the long straggling village of Kami-Yoshida in the Yamanashi Ken. Here, in a little wayside garden, standing head and shoulders above a tall wooden fence, I saw a strikingly beautiful tree, its boughs completely whelmed in a mass of deep pink blossom. A closer inspection showed that it was a Cherry hitherto unknown to me—unknown, at any rate, in that form. For many years—perhaps for half a century or more—a densely double, pink-flowered weeping Cherry has been grown in European and American gardens under a various assortment of names. In 1913 WILSON described this tree in his book on Japanese Cherries as *Prunus serrulata f. rosea*, but was unable to state its provenance. Up to that date, neither he nor I had encountered it during our travels in Japan, and it was not included in any of KOIDZUMI's or MIYOSHI's publications.* Owing to these facts and its very characteristic foliage and flowers, I thought at first that it must have originated in China. You can therefore imagine my surprise and delight when I came upon the counterpart of this very lovely Cherry in a little mountain village in Japan. True, it was not the well-known weeping variety of our English gardens (I came across a single specimen

---

* MIYOSHI has since published an account of this Cherry in the *Tokyo Bot. Mag.*, vol. xxxvi., 1922, where he has named it *P. serrulata plena pendula*.

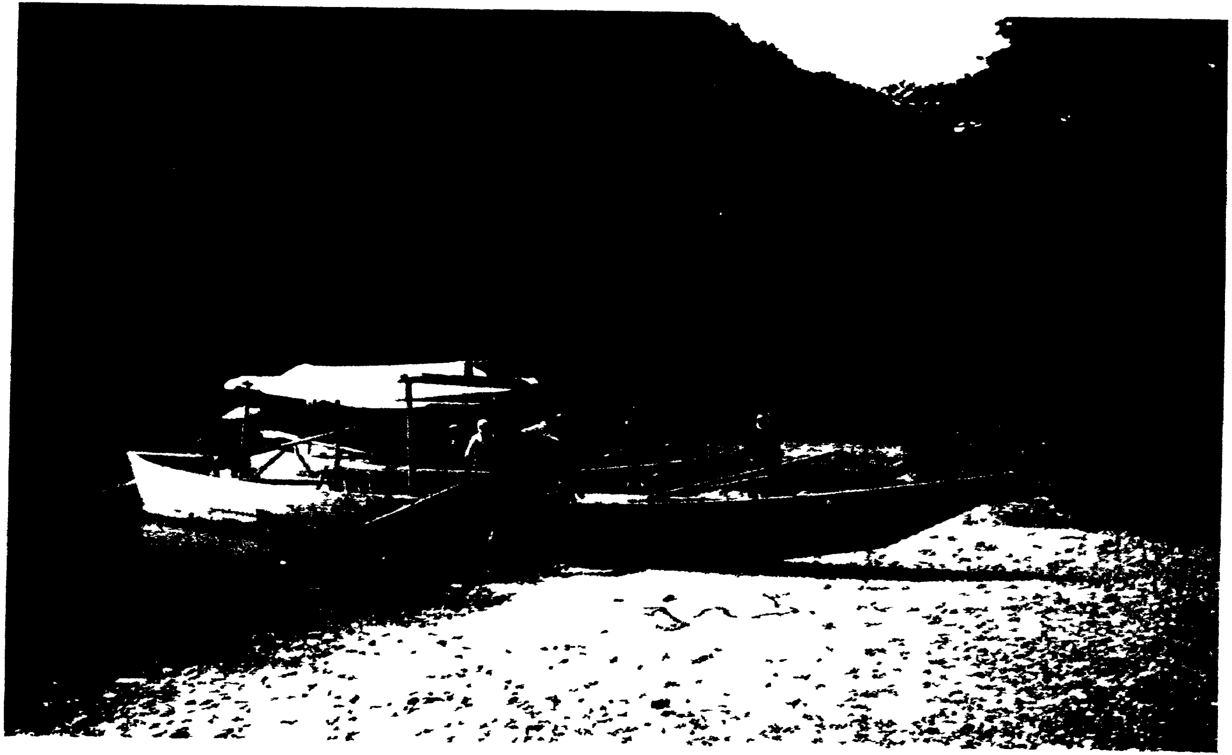


FIG 79—ARASHIYAMA THE FAMOUS CHERRY RESORT NEAR KYOTO
The woods contain large numbers of *Prunus mutabilis*

[*To face p* 168

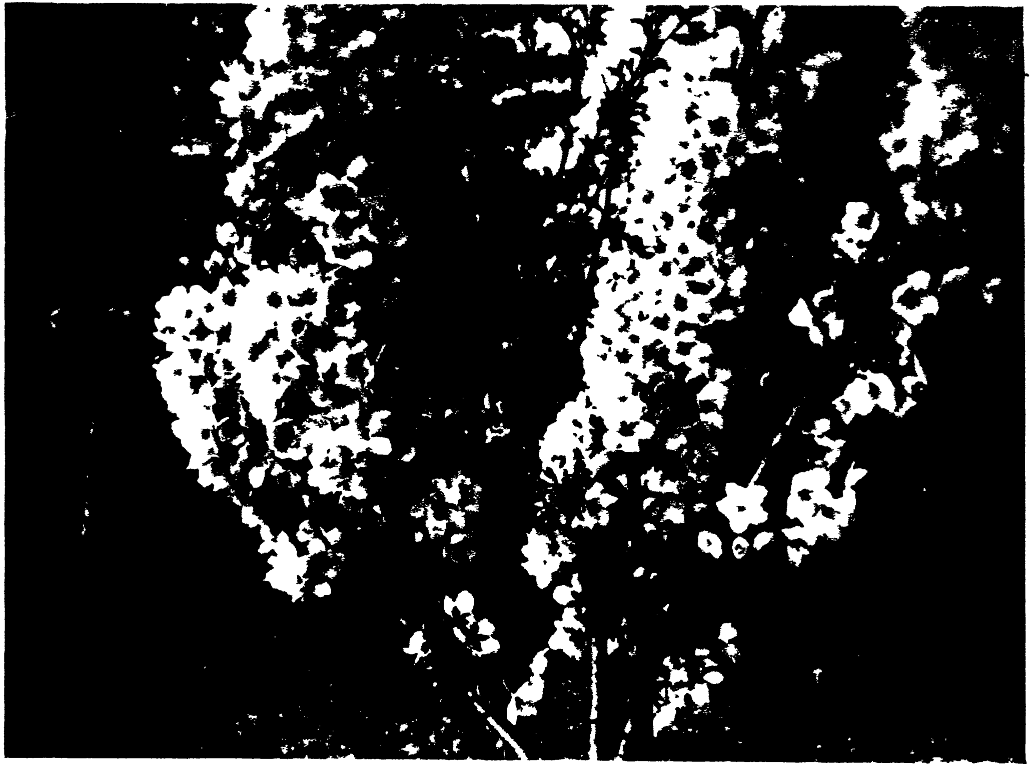


Fig. 80.—Botan Zakura at Benenden, Kent

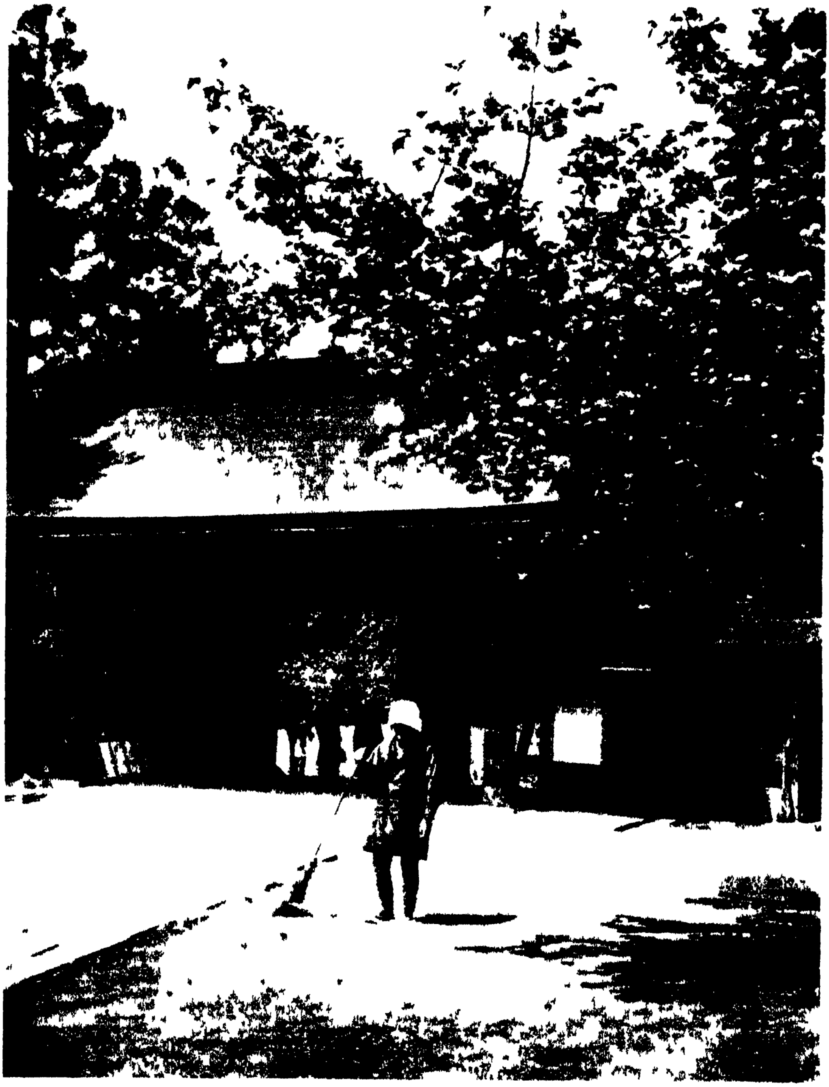


Fig. 81.—Prunus serrulata 'Fugenzo' in the Temple Garden at Nikko.

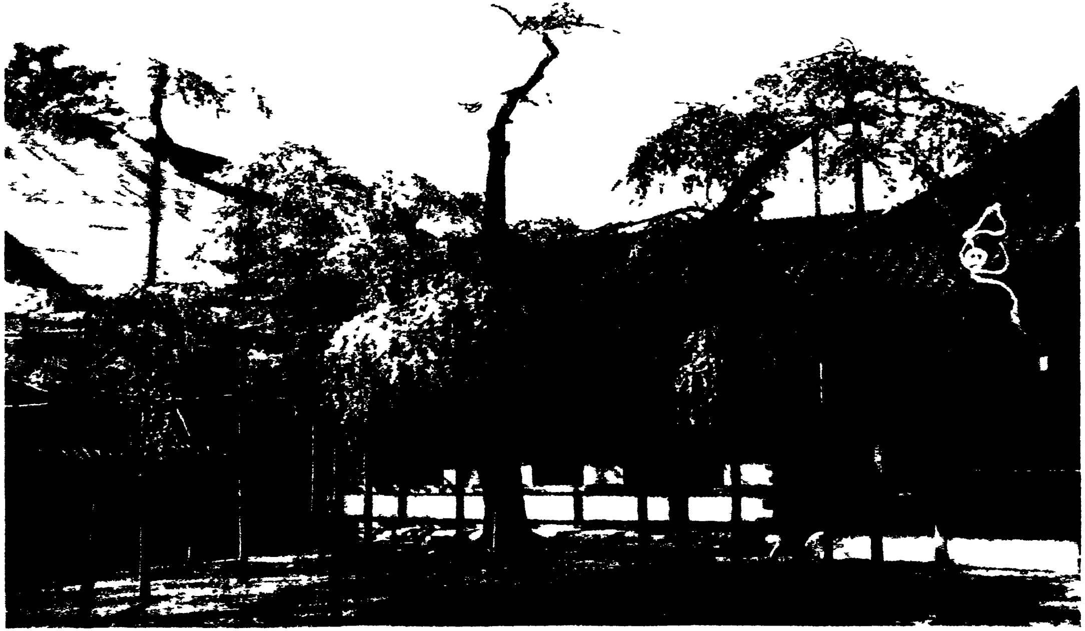


Fig. 82.—The Weeping Higan-Zakura at Sambo-in, near Kyoto

[*To face p.* 169.

of this later), but a more beautiful and a more shapely form of it. The thought that instantly flashed into my mind was—How could I get the plant back to England? Now it so happened that more than twenty years ago I had visited this same mountain district on an ornithological expedition, and my memory recalled a certain one-legged innkeeper. I remembered him, because in those days a maimed soldier was something of a rarity, and the fact that the fellow had lost a limb in Russian territory had rendered him a local notoriety. As luck would have it, my one-legged innkeeper was still living in Yoshida and, moreover, proved to be a very enthusiastic gardener. Into his sympathetic ear, therefore, I explained my difficulties. Would he be so kind as to send me scions later on? Of course he would! And what is more, he kept his word, and a couple of sturdy offspring of this Yoshida Cherry are now growing in my garden.

Later on I met with this variety again in Kyoto—a single specimen growing in the precincts of a Shinto shrine—but it must be very rare in Japan, and, so far as I know, is an undescribed form.

In the narrow and somewhat lanceolate shape of the leaves, and its very double mauve-pink flowers (which are borne in bunched clusters on a short-peduncled inflorescence), this Cherry closely resembles *P. serrulata rosea*, but differs by its upward growing, instead of pendent, branches. I regard this Cherry as an important acquisition to our English gardens and perhaps one of the best of my Japanese "discoveries."

As mentioned above, I subsequently saw a single tree of the weeping *P. s. rosea*. This was in the neighbourhood of Yokohama, where I was informed that it was known as the 'Kiku-Shidare-Zakura' (meaning the Weeping Chrysanthemum Cherry). MIYOSHI also records this variety from Aikawa in Rikuchu Province.

Asano was the central figure of the well-known tragedy of the Forty-seven Ronins. The trivial name of this Cherry has been bestowed in memory of this national hero. The history of the varietal name is another story, which does not concern the reader.

44. YEDO-ZAKURA.

Prunus serrulata nobilis, Miyoshi.

Unfortunately this is not a particularly vigorous variety, and its weak constitution seems to render it susceptible to attack from aphis and other pests. In this respect it resembles its near relative 'Oshokun' (*P. s. conspicua*). In both these forms the foliage is rather smooth and soft in texture. The young leaves of 'Yedo-Zakura' are pale golden-copper. Serrations pronounced with finely pointed tips. Leaf glands usually present and rather conspicuous. In the bud stage the semi-double flowers deeply coloured, almost carmine, passing to almond-pink when fully open, borne in fairly compact clusters. It differs very little from 'Beni-tora-no-o' (*P. s. formosissima*), but has, perhaps, slightly deeper coloured flowers and smaller bracts.

45. BENI-TORA-NO-O.

Prunus serrulata formosissima, Miyoshi.

Syn. *P. Lannesiana f. benitoranowo*, Wilson.

Why this Cherry should be dubbed Red Tiger's Tail (which, I understand, is the translation of Beni-tora-no-o) is beyond my comprehension. MIYOSHI'S varietal name is certainly more suitable, for it is a lovely plant. Although it seems to have a slightly better constitution than Yedo-Zakura (from which it is doubtfully distinct), it cannot be described as one of the vigorous varieties. The flowers are carmine in the bud, clear pink when open. They are semi-double, usually having from eight to ten petals. This Cherry and Yedo-Zakura are among the few varieties that perhaps thrive better on a native root stock.

15. TEMARI.

Prunus serrulata temari, Koidzumi.

(See also JOURNAL R.H.S., **50**, p. 87, No. 15.)

(ITO-KUKURI.)

In my last paper I stated that this variety bore " close clusters of pale pink blossom, which literally smother the steeply ascending semi-erect boughs with masses of apple-like flowers." This is only true of the mature tree, for in fast-growing immature plants this characteristic bunching of the blossom is not apparent, and in such the flowers are more or less loosely scattered along the branches and have moderately long pedicels and a distinct peduncle. In the older specimens these parts become much abbreviated. When in Japan I was informed that Ito-Kukuri was very like Temari, but MIYOSHI'S plate does not support this statement.

If there are not two forms of this Cherry, it must have a very variable constitution. Some of my plants are proving themselves comparatively vigorous, while others refuse to make headway and remain stunted and unhealthy.

16. OSHOKUN.

Prunus serrulata conspicua, Miyoshi.

(See also JOURNAL R.H.S., **50**, p. 88, No. 16.)

In my previous article I stated that I was hoping to obtain more vigorous plants of this variety by growing it on *P. Avium* roots. This hope has not materialized ; it seems to be an equally feeble grower on any stock.

Oshokun appears to be related to both Yedo-Zakura and Beni-tora-no-o, having the same smooth-textured foliage and clear pink flowers. It is characterized, however, by its narrower leaves and more particularly by its conspicuously bearded, almost laciniated, bracts. It is lovely in flower, but ugly in habit.

46. HORINJI.

Prunus serrulata decora, Miyoshi.

(KABUTO-ZAKURA.)

This variety reached me by way of America, and I rank it high among the garden forms. The semi-double flowers are of good shape, being open in the centre with the soft pink petals arranged in two or three tiers. The tapering cupula and calyx are vinous-brown and contrast prettily with the pale hues of the corolla. The young leaves are reddish-bronze.

I saw a Cherry in Japan called Kabuto-Zakura very similar to, or identical with, this variety.

47. ICHIYO.

Prunus serrulata unifolia, Miyoshi.

The Japanese name of this Cherry means " one leaved," the variety being so called on account of the solitary leafy carpel often found in the centre of the flower. This is not, however, invariably present, the pistil often being duplicated instead. It is a beautiful form with soft pink blossom, three or four being borne together in a long-stalked corymb. The individual flowers are well-shaped owing to the petals bring arranged in two rather tightly packed tiers, which serve to give the bloom a compact, evenly circular, and somewhat frilled appearance.

Diameter of flowers about 4·7 cm. It is a mid-season variety of fairly good constitution. The young leaves are bronzy-green.

48. OKIKU-ZAKURA.

Prunus serrulata okiku, Ingram nom. nov.

I have not been able to place this Cherry. It came to me as a scion from America with the name Okiku-Zakura which, translated, means the " Large Chrysanthemum Cherry." Large it certainly is; and if its doubleness suggests to some minds a similarity to a Chrysanthemum, the name is not inappropriate. But it is not MIYOSHI's Kiku-Zakura (*P. s. chrysanthemoides*), which appears to have a multitude of petals, nor can I find a description to fit it in WILSON's monograph.

Okiku-Zakura is of gaunt and rather ugly habit, but its large pink flowers borne in pendent clusters from the two- or three-year-old branches are very fine, and more than compensate one for the winter stiffness of the plant. This Cherry seems to have an unbalanced constitution. It makes strong lush growth, and has every appearance of being vigorous, yet it is very prone to attack from insects and disease. It is a favourite nursery for black fly, and branchlets are constantly dying back with brown rot—faults which would deter one from cultivating it were it not for the splendour of its blossom.

The young foliage is bronze-green. Cupula small and tapering; sepals rather long and narrow. The flower buds before opening are rather "square shouldered," that is to say, broadly angular at the base.

19. OKU-MIYAKO.

Prunus serrulata longipes, Miyoshi.

(See also JOURNAL R.H.S., **50**, p. 89, No. 19.)

I have had this variety sent to me from America as Shogetsu, but I saw a Cherry so named in Japan that was certainly different. Oku-Miyako is one of the best of the late varieties, and when its spreading boughs are festooned with long-stalked corymbs of snow-white flowers, the tree is certain to inspire admiration.

This is one of the varieties that is, perhaps, better grown on a native stock. It unites freely with *P. Avium* and grows well for the first few years, but later I have noticed some of these plants looking a little unhappy, as though head and root were not in perfect harmony.

49. SHIROTAE.

Prunus serrulata sirotae, Ingram n. comb.

Syns. *P. serrulata f. albida*, Miyoshi.
P. Lannesiana f. sirotae, Wilson.

(KOMATSUNAGI-KOJIMA.)

Shirotae (meaning snow-white) might be described as a double form of my Kojima. It is true that in immature and vigorous specimens of Shirotae the flowers are less double, and in this state the two varieties closely resemble one another. The following are the notes I made in Japan with the plants before me.

"Shirotae is a large-flowered, white variety. The foliage is very similar to that of Kojima, but the buds, branches, and inflorescence are more robust and coarser. The flowers are large semi-double, with from eight to twelve petals,* measuring about 5·3 cm. Calyx dark brownish on the sunny side. The peduncle appears to be as long as, or longer than, the pedicels, which are relatively short, which causes the flowers to have a rather bunched appearance." The Japanese Cherries imported to this country as 'Mount Fuji,' are generally the variety Kojima.

MIYOSHI calls Shirotae *P. serrulata albida*, but this varietal name has, according to WILSON'S list of synonyms, been previously applied by MAKINO to *P. speciosa*, so cannot stand.

Komatsunagi is a name given to a single white of the same group. The plants so called that have reached me from Japan are doubtfully distinguishable from Kojima, but those shown to me by Mr. FUNATSU had smaller flowers (about 3·5 cm. in diameter), and these were sometimes slightly tinged with pink.

---

* In my English plant they often exceed this number

I am inclined to think that Kojima, Shirotae, and Komatsunagi all have a tendency to merge into one another and, in the young state at any rate, are very difficult to determine.

50. TAI-HAKU.

Prunus serrulata taihaku, Ingram.

(See also *Gardeners' Chronicle*, 1926, p. 409, and 1927, p. 107.)

Some time towards the end of last century a certain English lady imported a collection of Cherries from Japan, and had them planted in her Sussex garden. Most of the trees are still living, and amongst them I found two varieties that are now extremely rare, perhaps even extinct, in the country of their origin. Tai-Haku is one of these. To my mind it is the most beautiful of the single whites. Its great charm lies in the striking contrast between the snowy whiteness of its immense flowers and the rich reddish-copper of the young foliage. In strong plants the flowers measure up to 6 cm. in diameter, and are borne in clusters of two or three. The sepals are rather long and narrow, while the cupula is small and thin. So far this Cherry has proved itself a vigorous grower with me; and, if it fulfils its promise, Tai-Haku should become a great favourite. When in Japan, Mr. FUNATSU showed me a painting of this variety executed in Kyoto about 1700, but he had never seen a living plant.

23. JO-NIOI.

Prunus serrulata affinis, Miyoshi.

(See also JOURNAL R.H.S., **50**, p. 91, No. 23.)

(ZENKOJI : SAKON : HITOMARO.)

I have received several named varieties from Japan that have proved to be barely distinguishable from Jo-nioi. Zenkoji differs only in having a more upright and sparsely-branched habit. Sakon I cannot separate. Among the exhibits shown by members of the Sakura-no-Kwai in 1925, I saw a variety named Hitomaro, which was said to differ from Jo-nioi only by being scentless.* They are delightful plants, very free with their snow-white flowers and pleasingly fragrant. The blossom is usually at its best during the latter half of April.

51. HATAZAKURA.

Prunus serrulata hatazakura, Ingram n. comb.

Syn. *P. donarium* subsp. *speciosa* var. *nobilis f. Hatazakura*, Koidzumi.
P. serrulata f. vexillipetala, Miyoshi.

(OUCHI-YAMA : TAIMIN.)

There are several white Cherries of small merit that are barely distinguishable, the differences in most cases being too subtle for

---

* Plants labelled 'Hitomaro' subsequently received from Japan have proved to be identical with Tora-no-o. In any case this name must be regarded as a synonym.

Western eyes. In this category may be placed Hatazakura, Ouchi-Yama, Tai min, and several others. None of these is a first-class garden plant and they should make room for their more handsome relatives. In the flowers of all the above the edges of the petals are cut with jagged incisions. This frayed appearance, suggesting the tattered fringe of a flag, has given rise to the name Hatazakura, which means 'Flag Cherry.'

32. YOSHINO.

Prunus yedoensis, Matsumura.

(See also JOURNAL R.H.S., **50**, p. 96, No. 32.)

In 1913 WILSON suggested that this so-called species might be a hybrid between *Prunus subhirtella ascendens* and *P. speciosa* (*P. Lannesiana*). In my last paper I expressed agreement with this view, an opinion which has been greatly strengthened by some young plants raised from Yoshino seed, sent to this country from the Arnold Arboretum. These all showed a tendency to revert to *P. subhirtella*, which is probably the dominant parent; the *P. speciosa* "blood" was less apparent. Mr. PAUL RUSSELL of Washington informs me that he has seen typical *P. yedoensis* raised from seed, but this does not necessarily disprove the hybrid theory.

In Tokyo this Cherry is the prevailing variety and thousands may be seen in the public parks of that city. Its popularity is no doubt partly due to its very easy propagation and rapid growth. Under suitable conditions the tree is almost as vigorous as a Poplar, but there are indications that it is short-lived, for one very rarely sees a full-sized specimen without some sign of premature decay.

The finest and healthiest avenue of *P. yedoensis* that I saw during my last visit to Japan was at Utsunomiya, a small town about twenty miles south of Nikko.

The name 'Yoshino' for this Cherry is very misleading. The wonderful groves that have made Yoshino, in the mountains of Yamato, world-famous are composed almost exclusively of the wild Hill Cherry, *P. mutabilis*.

52. SHIDARE-YOSHINO.

Prunus yedoensis pendula, Ingram.

In my collection I have two forms of Yoshino with very pendulous habit. One of these reached me via America; the other was imported direct from Japan. To my mind neither of these is as beautiful as the typical tree, but perhaps I am a little prejudiced against weeping plants. Properly trained and grown in the right place they would no doubt be very effective, although even so I am not an admirer of a tree that cascades its branches straight into the ground.

The flowers of both resemble those of the ordinary Yoshino, but are perhaps a little smaller. They appear to have a vigorous constitution and to thrive well on Gean stock. They differ slightly from one another in the shape and texture of their foliage.

53. TAIZANFUKUN.

Prunus serrulata ambigua, Ingram n. comb.
P. fruticosa ambigua, Miyoshi.

(MOMIJI-GAWA : HOKIZAKURA.)

Under the above name and that of Momiji-gawa I have received a somewhat aberrant Cherry of semi-fastigiate habit. It is characterized by its clusters of very double pale pink flowers with pubescent pedicels. MIYOSHI has given it specific rank. WILSON, on the other hand, calls it *P. serrulata var. pubescens f. taizanfukun*, but has curiously associated its varietal form, Shojo, with *P. yedoensis*. As *P. yedoensis* is almost certainly a hybrid it can have nothing to do with either of these Cherries.

The foliage of Taizanfukun is rather narrow and small, and is golden-bronze when young. The bark of the two- or three-year-old wood is somewhat rough and peeling.

Hokizakura—or the " Broom Cherry," so called from its somewhat twiggy growth—is apparently another name for this plant.

54. FUDAN-ZAKURA.

Prunus serrulata semperflorens, Miyoshi, *Tokyo Bot. Mag.*, xxxvi., No. 421, p. 12.

Syn. *P. s. fudanzakura*, Ingram, *Gard. Chron.*, Jan. 9, 1926.

(SHIKIZAKURA.)

Fudanzakura means " Continuous Cherry." This variety has been well named, for its flowering period usually lasts for several months every year. In 1925 it commenced to bloom with me before the end of November and continued, on and off, until late in April. During the winter months the flowers are borne in close clusters on the naked wood, the pedicels at this season being very short. As the foliage appears these increase in length and are finally supported by a peduncle, the inflorescence then assuming the more usual corymbose form. In our climate the winter blossom is often retarded and crippled by frost; but in open weather it is a valuable asset to a garden, and is especially useful when cut and brought indoors. The individual flowers are about 4 cm. in diameter ; they are pink in the bud, but fade to pure white when fully expanded. The calyx is reddish. Foliage with a sparse, harsh pubescence in the under surface.

I have received this Cherry from Japan under another name, Shikizakura, but this is apparently a local synonym. This form should prove a valuable plant for forcing purposes, as it is very floriferous and could probably be brought into bloom at any time during the winter.

55. KABA-ZAKURA.

Prunus serrulata kabazakura, Ingram nom. nov.

(See also JOURNAL R.H.S., **50**, pp. 94 and 95.)

(KIRIGINU : SHIN-NISHIKI.)

There are several garden forms with pale yellowish or greenish flowers. Two of these are already in frequent cultivation in this country, viz. Asagi and Ukon. These are barely distinguishable, but the former usually opens its blossoms a few days earlier, is generally more single, and is of a slightly paler hue. Gioiko is a less vigorous plant, and has more green in its flowers, with occasionally a tinge of pink. Kaba-Zakura, Kiriginu, and Shin-nishiki are also greenish-flowered Cherries, the first named being the best. The semi-double, or double, flowers of Kaba-Zakura are produced in somewhat bunched clusters, the outer petals being of a greenish colour stained with vinous-pink, while the inner petals are greenish-cream. The young leaves are copper-bronze as in Ukon.

The present form, Gioiko, Kaba-Zakura, Kiriginu, and Shin-nishiki are all very much alike, and, as the intensity of the greenish shade in the flowers varies according to the vigour of the individual plants, these varieties are extremely difficult to separate.

THE SPRING CHERRIES.

33. HIGAN-ZAKURA.

Prunus subhirtella, Miquel.

(See also JOURNAL R.H.S., **50**, p. 97.)

It is a hopeless task to attempt to differentiate or enumerate all the forms of this charming species. It may grow cheerfully up to the heavens as a fine sturdy tree, or it may weep as despondently as a Babylonian Willow : again, its flowers may be either white or pink, sometimes comparatively large or, more usually, quite small. But in all its variations it is a highly desirable plant, the least attractive form being the rather shy, poor-flowered tree that is usually sold as *Prunus subhirtella ascendens*.

The Spring Cherry, or Higan-Zakura as the Japanese call it, is commonly planted in the neighbourhood of Kyoto, and it was in and about this city that I saw some of the finest forms (fig. 82). For instance, in the Kiyomidzu Temple grounds there is an old tree, unfortunately in the last stage of decrepitude, with quite large, semi-double, pink

FIG. [illegible].—THE ANCIENT HIGAN ZAKURA IN THE MARUYAMA PARK, KYOTO

[To face p. 177

blossom; and in the Maruyama Park of the same city, there is another (fig. 83) with single flowers nearly as big as those of a Yoshino Cherry. But undoubtedly the most beautiful of all is the Sendai-Ito-Zakura—a deep pink, double-flowered variety with a long pedicelled inflorescence. Its flowers open later, last longer, and are much more richly coloured than those of any of the other Spring Cherries. As its name denotes, it comes from Sendai, a city in Northern Japan. With infinite trouble to myself, and no less trouble to my Japanese friends, I have had grafts of all these varieties sent over, but their thin twiggy wood does not travel well, and I have, so far, failed to obtain plants.

Lovely as it is in England, the Higan-Zakura is still finer in Japan. There the flowers seem to be more precocious and appear to open before the foliage, which is not always the case over here. It is apparently a long-lived tree, and I saw some superb specimens during my travels. There is an exceptionally fine avenue of them in the Tsutsuji-gaoka Park, Sendai, one of the trees being over 40 feet in height with a spread of branches nearly 50 feet through. The circumference of the bowl of this tree at 3 feet above the ground was about 10 feet; another trunk girth measured in the same locality was as much as 16 feet near the ground. But perhaps the finest of all was a solitary specimen growing on a little hillock near Matsushima. As we approached the village from the seaward side, while we were yet several miles from the shore, the eye was attracted by the solid splash of pink on the landscape. Upon closer acquaintance this mass of colour proved to be a magnificent Higan-Zakura, growing by the side of a small deserted shrine. The trunk was of immense size—I estimated the girth to be about 18 feet near the ground—and the lower boughs were proportionately massive. The tree stood over 40 feet in height and almost as much through—a dense cloud of rosy-pink, every twig being closely packed with blossom. I have rarely seen a more beautiful object.

According to tradition the largest and oldest Cherry in Japan is of this species. It stands in the precincts of the Jissoji temple in Kitokomagun, Kai Province. This venerable tree is called the Jindai-Zakura ("The Cherry of the Age of God") and is stated to be about 1,800 years old. Although probably a very ancient specimen, I cannot help thinking its age must have been greatly exaggerated. Perhaps this is the explanation. Some notoriety, perhaps a priest or some warrior or potentate, originally planted a Higan-Zakura with much pomp and ceremony, and the event was no doubt duly recorded and pigeon-holed in the archives of the temple. In course of time the tree waxed big, became fully mature, and ultimately died. It was then replaced by another of exactly the same sort which in due course also aged into a fine tree—possibly the existing one, or its predecessor.

This, at any rate, is the history of the famous weeping Higan-Zakura in the Bhuddist temple of Sambo-in, near Kyoto. The unsuspecting tourist is solemnly informed that the mighty Hideyoshi sat under its branches when it was his wont to frequent this garden in the sixteenth century. Investigation, however, reveals the sober fact that the present tree was only planted about 1868 " to replace a similar one set out by Hideyoshi."

But to return to our famous Jindai-Zakura. In a small guide book entitled " The Blossoms of Japan," its height is given as 90 feet, " with branches spreading ninety to one hundred feet."

The Japanese prop up the boughs of all their favourite old trees with painstaking care, and by so doing undoubtedly prolong their life. This commendable practice has produced some amazing specimens, the like of which are rarely seen in other countries ; their gnarled decrepitude is often delightfully picturesque and a joy to behold.

56. USU-KAN-ZAKURA.

Prunus campanulata, Maximowicz.

(BENI-KAN-ZAKURA.)

This Cherry is really a Formosan species, but is cultivated in the southern districts of Japan. Personally I only saw a few small plants in that country, but WILSON says it is commonly grown near Kagoshima in Southern Kyushu. It is much to be regretted that our winters are too rigorous for this lovely tree. I have imported it several times, but after a lingering existence it has usually died without having attempted to flower. Under glass the blossoms are produced very early in the year—usually about February—and are very beautiful. They are pendent, of a deep rosy-red hue, with red filaments and yellow anthers. In California, where it apparently thrives, this Cherry has been acclaimed one of WILSON'S best introductions. Given sufficient moisture it should do quite well on the Riviera, and I am glad to learn that Major JOHNSTON has recently introduced it into his Mentone garden.

In California I am informed that this Formosan Cherry is often grown successfully on *P. Avium* stock: it might be worth trying in Europe.

The names Usu-Kan-Zakura and Beni-Kan-Zakura, mean " Red Winter Cherry "—so called on account of the colour and earliness of its blossom.

57. FUJI CHERRY.

Prunus incisa, Thunberg.

The Japanese call this Cherry Fuji-Zakura on account of its abundance on the eastern slope of the sacred mountain, but it is also plentiful on the shores of Lake Hakone. I did not meet with it elsewhere in Japan, nor did I encounter it below an elevation of 1,800 feet. In the above-mentioned mountain localities it was not in full flower until the end of April, but in my Kentish garden it usually blossoms two or three weeks earlier. I have a weakness for this Cherry. A sturdy, stocky little tree, whether in sunshine or shade it is always happy and cheerful. Nothing seems to daunt its determination to flower, and each spring it completely clothes itself in snowy blossom. At a distance the flowers often appear to have a roseate hue. This is produced by the red of the cupula and calyx merging with the white petals, the mass effect being soft pink. It is true that the centres of the nodding flowers become stained with vinous before the petals fall, but I have yet to see a genuine pink variety of this Cherry.

I have been lucky enough to raise two or three accidental hybrids of this species. One of these undoubtedly has *P. speciosa* for its pollen parent. The flowers of this plant are intensely white and of good shape and substance—in fact all its characters might be described as intermediate between the two species. I have called this seedling Umineko, meaning Seagull, and under this name it received an Award of Merit when I showed it at Vincent Square in April 1928. A second hybrid shows unmistakable relationship with *P. subhirtella*. Its flowers are pink and comparatively large. Both these crosses are extremely vigorous and promise to be good garden plants.

P. incisa has many virtues. It is completely hardy, very floriferous, and has neat, Birch-like foliage with deeply cut serrations. Under favourable conditions it makes a small, compact tree about the size of an English Hawthorn, but in this country it is more usually seen in bush form.

The leaf incisions vary a good deal, and a variety with very deeply cut, double serrations has been named by KOIDZUMI *P. incisa f. serrata*.

WILSON declares that this is the only Japanese Cherry that can be fashioned into the so-called dwarfed trees. Although frequently used for this purpose, it is by no means the only variety that can be crippled and maltreated in this way. I have often seen the garden forms of *P. serrulata* dwarfed by the Japanese, and a number of these were exhibited at the annual meeting of the Sakura-no-Kwai in Tokyo in 1926.

58. CLOVE CHERRY—CHOJI-SAKURA.

Prunus apetala, Franchet and Savatier.

I met with this Cherry in the Nikko district, where it is common. Here it is essentially a sylvan species, being often found in the deep forest glades growing as a straggling undershrub. Under better conditions it no doubt makes a small tree, but even so it cannot be a thing of much beauty. The flowers are small and fugacious, with characteristically long, cylindrical cupulas. The leaves are edged with coarse, jagged serrations and are pubescent on both surfaces.

I had the doubtful distinction of introducing this Cherry (which the Japanese call Choji-Sakura or Clove Cherry, possibly on account of the Clove-like appearance of the cupula and sepals) to England in 1924. There are many other species more worthy of garden room, and its chief merits seem to be a good and hardy constitution.

59. MIYAMA-SAKURA.

Prunus Maximowiczii, Reprecht.

Although WILSON says that this species is common in the thickets and forests of Central Hondo, I failed to recognize it during my travels in Japan. It thrives in my garden, but so far has proved itself rather a shy flowerer and therefore of little ornamental value. The inflorescence is in the form of an upright raceme, composed of six or more rather small white flowers, with distinctive leafy bracts at the base of the pedicels. The Miyama Cherry is said to make a medium-sized tree up to 30 or 40 feet in height. It was introduced into America in 1892, and reached Kew three years later, but is still very rare in English gardens. According to BEAN this species colours well in the autumn, but as yet my plant has shown no inclination to do so. The foliage is distinctly serrated and prominently veined.

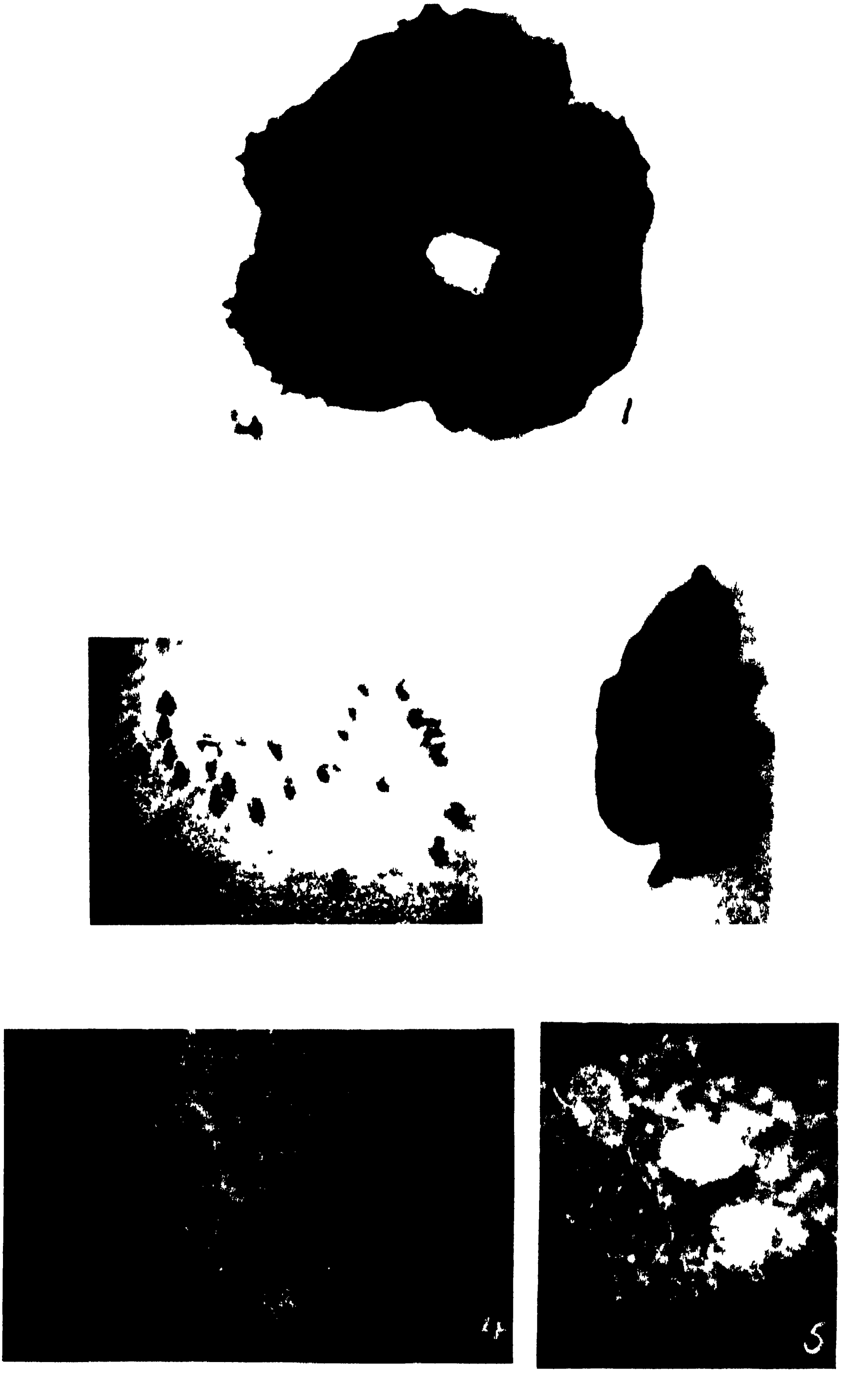


FIG. 54 WHITEFLY, TRIALEURODES VAPORARIORUM EARLY STAGES.

(1) Eggs on Pelargonium leaf Nat size (2) Eggs on Tomato leaf × 12
(3) Young scales on Tomato leaf, natural size
(4) Young scales on Tomato leaf × 12 (5) Pupae on Tomato leaf × 12

[*To face p* 180

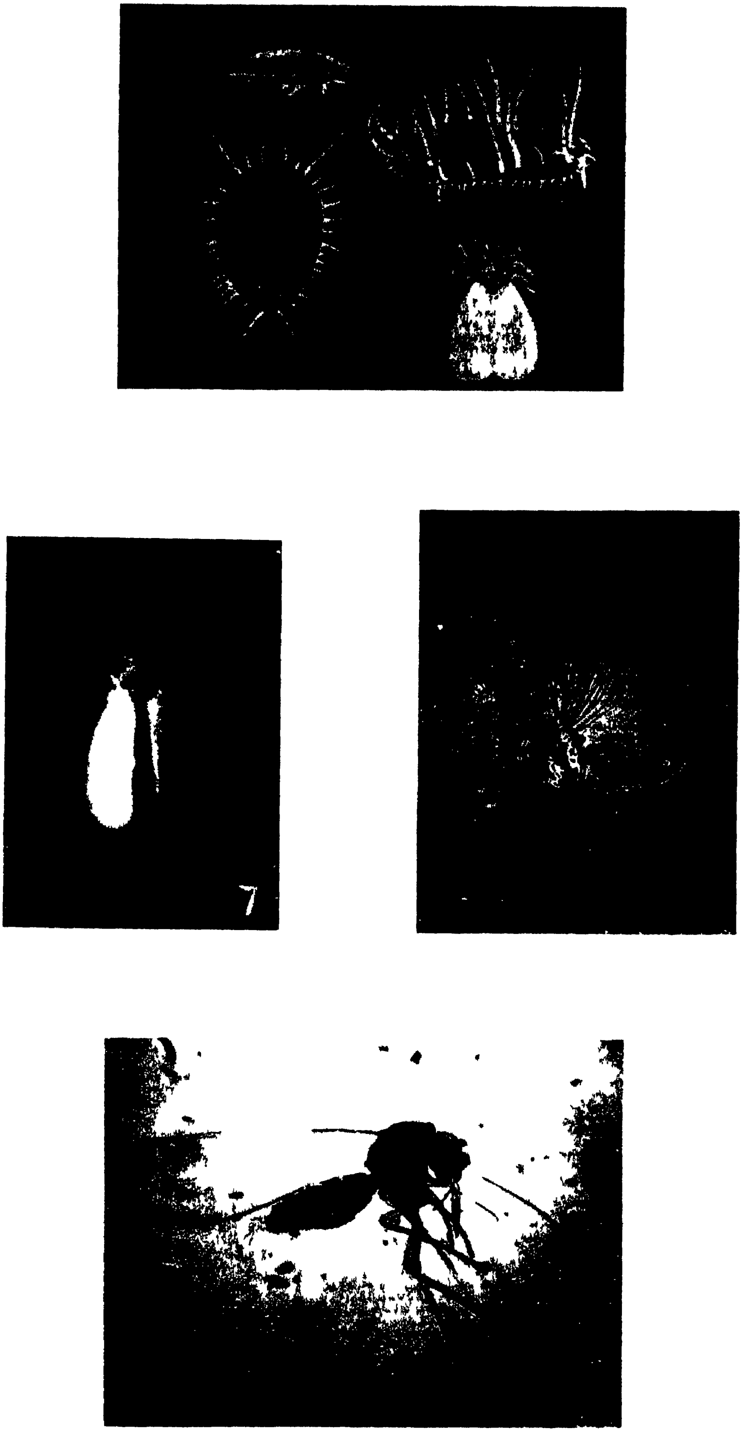


FIG. 85.—WHITE-FLY, TRIALEURODES VAPORARIORUM.

(6) Life cycle (diagram) Egg, larva, pupa, adult.
(7) Adult on Tomato leaf × 15. Adult (8) male, (9) female × 50.

THE GREENHOUSE WHITE-FLY
(*Trialeurodes vaporariorum* Westwood).

By EDWARD R. SPEYER, M.A.,
Entomologist to the Experimental Station, Cheshunt, Herts.

[Read June 5, 1928; Mr. H. B. May, V.M.H., in the Chair].

OUR knowledge of the habits, life history, and control of the Greenhouse White-fly is based largely upon the work of Dr. LL. LLOYD, who published the results of his researches at the Cheshunt Experimental Station, situated in the heart of the great Lea Valley glasshouse growing area, in 1920 [1 and 2].*

Before Dr. LLOYD's method of "cyaniding" tomato houses was established, together with his discovery of the use, as an alternative, of tetrachlorethane, an organic liquid which now forms the chief constituent of nearly every proprietary White-fly fumigant at present on the market, it is estimated that more than one-third of the total tomato crop from an odd thousand acres in this valley alone was lost through direct damage by the insect, combined with faulty methods of cyanide fumigation.

Since that year, though the habits of the White-fly preclude its actual extermination upon these lines of control, severe infestations have annually been subjected to complete control at small cost and with a minimum loss of crop to the grower.

Recently some interesting developments in control of the insect have come to light, and the following account conveniently divides itself into four sections, the first dealing with the habits and life history, the second with established artificial means of control, the third comprising more recent modifications of the latter, and the fourth describing the utilization of a parasite as a biological means of combating the pest.

I. *Habits and Life History* (Figs. 84–88, 92).

Speculation as to the origin of any animal met with frequently in hot-houses is dangerous, as the fauna of these structures is largely cosmopolitan.

Brazil has been suggested as the native country of the White-fly which now occurs in glasshouses over a wide range in both hemispheres.

Though it became a pest of glasshouse plants in England some seventeen years ago, the fact that the insect is still unable to breed upon evergreens out of doors during winter in this country, and can only survive with some difficulty in the adult stage during this period, lends support to the assumption that it came from some warm climate.

---

* The numbers in brackets [ ] refer to literature listed on page 192.

On the other hand, under continuous hot and moist conditions such as occur in cucumber houses during periods of sunny weather, the insect practically ceases to breed, so that a tropical origin is exceedingly doubtful.

As a member of the great Order of insects known as the Homoptera, the White-fly is an insect with mouth parts modified for sucking sap from the foliage of plants upon which it breeds, and the family *Aleurodidae*—the " Snow-flies "—to which it belongs, shows certain affinities with the Plant-lice or Aphides on the one hand, and the Scale Insects or Coccids on the other, in addition to which the habits of the young stages show a slight resemblance to the Frog-hoppers which are concerned in the formation of the common Cuckoo-spit.

Some account of the anatomy and development of the insect has been given by E. HARGREAVES [5]. The most prominent portions of the adult anatomy are the two pairs of large white and waxy wings, and the long three-jointed rostrum or sucking-organ (fig. 85) ; along the anterior face of this runs a groove which contains the two pairs of short stylets : these are driven into the leaf-tissues by retraction of the rostrum into the head region when the insect feeds.

Toward the posterior end, upon the dorsal surface, is a prominence known as the operculum, beneath which the intestine opens at the base of a peculiar fan-shaped structure called the " lingula." The latter organ is best observed in the younger stages of the life history (fig. 87 and 88), but its function throughout is to keep in motion, through its continuous paddle-like movement, the excrement, which is blown in bubbles and constitutes the " honey-dew." In general appearance the sexes resemble one another, but the male (fig. 85 (8)) is readily distinguishable from the female (fig. 85 (9)) by the fork-shaped extremity of the abdomen.

The adults, which measure about one-twentieth of an inch in length and one-tenth of an inch in wing expanse, are gregarious, collecting together in vast numbers upon the upper foliage of plants (fig. 86). Except in autumn, when swarming takes place, they seldom fly unless disturbed, and then only for short distances. They rest and suck upon the underside of foliage, and are especially attracted to leaves of a yellowish colour. It is evidently the slight preponderance of yellow light in the glasshouse which induces them to enter from outside in the spring, and if a piece of yellow paper be held near an infested plant which is shaken, many will settle upon the paper, but they will avoid blue and violet colours, and will only fly to orange and green in proportion to the amount of yellow contained in each of the latter colours (LL. LLOYD [3]).

When mating, the male takes up a position close to the female and remains with her during the whole period over which the eggs are laid. The female, however, is able to lay eggs parthenogenetically in absence of the male, and recent work of F. SCHRADER [4] inclines to the view that there used to exist two races of the insect, the unfertilized eggs of that usually found in Europe developing to females only, those of the other, prevalent in the United States of America, to males only. The latter race appears recently to have become commoner in Europe than the former.

Normally the sexes occur in approximately equal numbers.

The chief glasshouse plants upon which eggs are laid, and subsequent development proceeds, are Tobacco, Tomato, Potato, Beans, Salvia, Primula, Heliotrope, Calceolaria, Abutilon, and certain varieties of Fuchsia, Begonia, and Pelargonium. Of late years Cucumbers, and allied Cucurbits, have been subject to severe infestation, while Eucalyptus is also attacked.

On weeds such as nettle and sow-thistle out of doors the White-fly is sometimes found breeding in large numbers, and towards the end of summer adults collect in vast numbers upon many varieties of plants in hedges near glasshouses, where such as survive severe frosts pass the winter without laying eggs.

The region of such a plant as the Tomato or Tobacco chosen for oviposition varies with the age of the plant. On very young plants the lowest and oldest leaves are selected, whereas on old plants the young top shoots are selected.

If side-shoots of Tomato plants are not removed the White-fly usually avoids the plants until they are old, then laying upon the topmost foliage.

On Tomato plants kept free from the fly when young, and exposed to infection later, the lowest foliage will be avoided and the mid-shoots chosen. The White-fly therefore appears to seek leaves which are performing a special function in the metabolism of the plant.

The number of eggs laid by a single female is about a hundred and thirty, at an average rate of five a day. They are deposited sticking up upon a short stalk in circles of about twenty upon the underside of the leaf of a plant with smooth foliage (fig. 84 (1) and (2)), but diffusely when the leaf surface is hairy. The circles are produced through the female anchoring herself by the rostrum and depositing the eggs at regular intervals while turning upon this axis.

Partially covered with a thick coat of wax (fig. 84 (2)), the eggs are at first greenish but soon turn black. As each measures only one-hundredth part of an inch in length, the egg is only visible as a black speck to the unaided eye.

The incubation period occupies not less than eight days, and may extend to three weeks if temperatures are low, but absence of sunlight is the main factor in prolonging the period.

The first stage larva (figs. 84 (3) and (4)) escapes from the egg-shell through a V-shaped crack which appears near the free end of the egg. When newly hatched it is transparent greenish in colour, and elongate in form, though flat and scale-like. The two larval eyes, or ocelli (fig. 87 (12)), are bright red and consist each of two simple ommatidia. Shortly after hatching, six abdominal segments become visible, but there is no thoracic segmentation. The three pairs of legs are very short and each is composed of five joints. The bulbous rostrum is very short, and the comparatively long stylets can be retracted within the thoracic region (fig. 85 (6)). Both operculum and lingula are completely developed in the hind region of the abdomen. In the anterior portion of the latter, slightly to each side, are a pair of conspicuous yellow cell masses which comprise an organ known as the mycetoma or pseudovitellus (fig. 87). They vary much in size in different individuals and, as in allied Homoptera, are excretory in function and contain a peculiar micro-organism which lives symbiotically within the insect, being passed through the reproductive cells from generation to generation.

Whereas the anterior portion of the alimentary tract resembles that of certain Hemiptera (IMMS [6], p. 338), such as Blissus, the mid-gut comprising four well-marked sacs, the hind intestine and malpighian tubes approximate to the structure obtaining in Coccids (fig. 87 (12) and (14)).

The various organs mentioned appear in all subsequent stages of development, including the adults, but the antennæ, legs, and rostrum of the latter differ much from those of the young. On hatching, the larva is capable of walking for a short distance upon the leaf surface, but cannot move from one leaf to another. In a few hours it comes to rest and anchors itself by means of the stylets which are protruded forward from the rostrum and are driven into the leaf tissues. A coating of white wax is secreted over the surface of the insect, and spines projecting radially from the sides become enveloped in a fringe of wax.

The whole subsequent development takes place in the same spot upon the underside of the leaf. Some six days after hatching, the larva moults, working the old skin off from before backwards by contractions of the abdomen, assisted at first by the legs.

The second stage larva (fig. 87 (13)) resembles the first in all essentials, but the legs are reduced in size, and the number of joints in each is only three.

On moulting a second time, the third and final larval stage (fig. 87 (13*a*)) is reached, resembling the second with the addition of a suture marking off the metathorax. A pair of folds appear anteriorly at the sides of the insect, these being channels in the wax covering by means of which air is conveyed to the tracheal breathing tubes, through spiracles of which there are two pairs upon the thorax, one pair upon the first abdominal segment, and a fourth pair to the side of the operculum. During development of the larval stages, growth of the scale is entirely in length and breadth, the former dimension increasing from one-ninetieth to one-fortieth part of an inch.

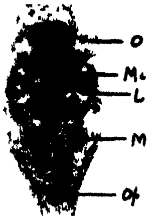
After a third moult the pupal stage (figs. 87 and 88) is reached, resembling at first the previous larval stage, but with the mesothorax marked off, and an additional posterior terminal breathing fold.

FIG. 86.—WHITE-FLY, TRIALEURODES VAPORARIORUM

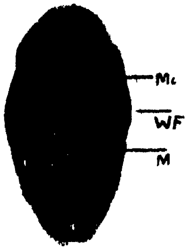
(10) Pupae on Fuchsia leaf × 2.

(11) Pupae on Tobacco leaf × 2

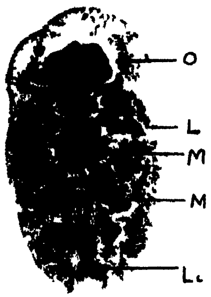
To face p. 184



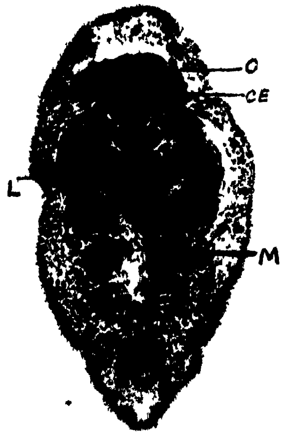
12

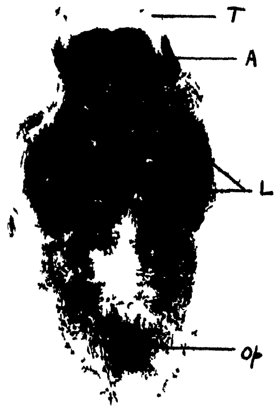


13



13a





14a

FIG. 87.—**WHITE-FLY**, TRIALEURODES VAPORARIORUM

(12, 13, 13a) Scale, 1st, 2nd, 3rd stages. (14, 14a) Early stages of pupa × 60. From microphotographs. For references to lettering see p. 192.

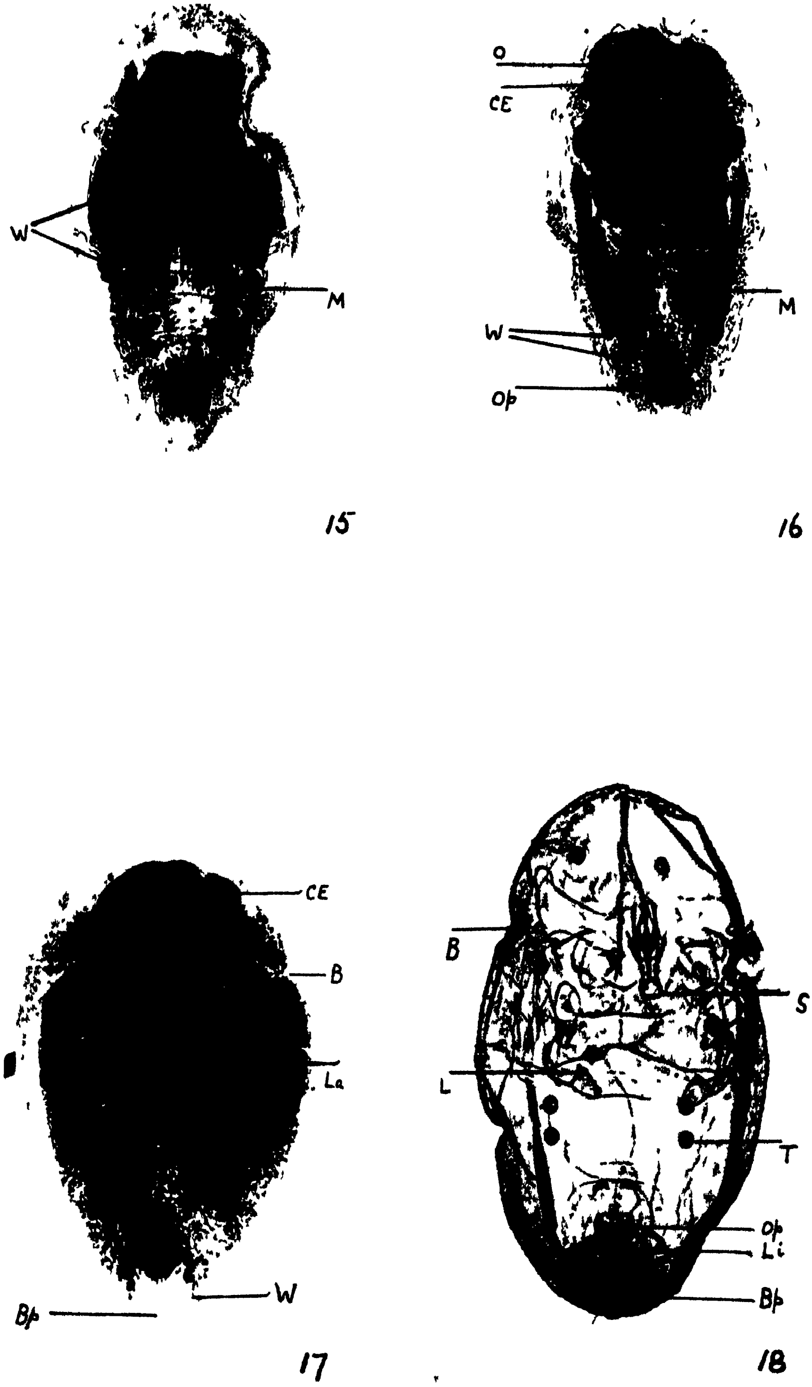


FIG. 88—WHITE-FLY, TRIALEURODES VAPORARIORUM

(15, 16, 17) Pupae in advancing stages (18) Pupal case after emergence of adult. From microphotographs × 60 For reference to lettering, see p. 192.

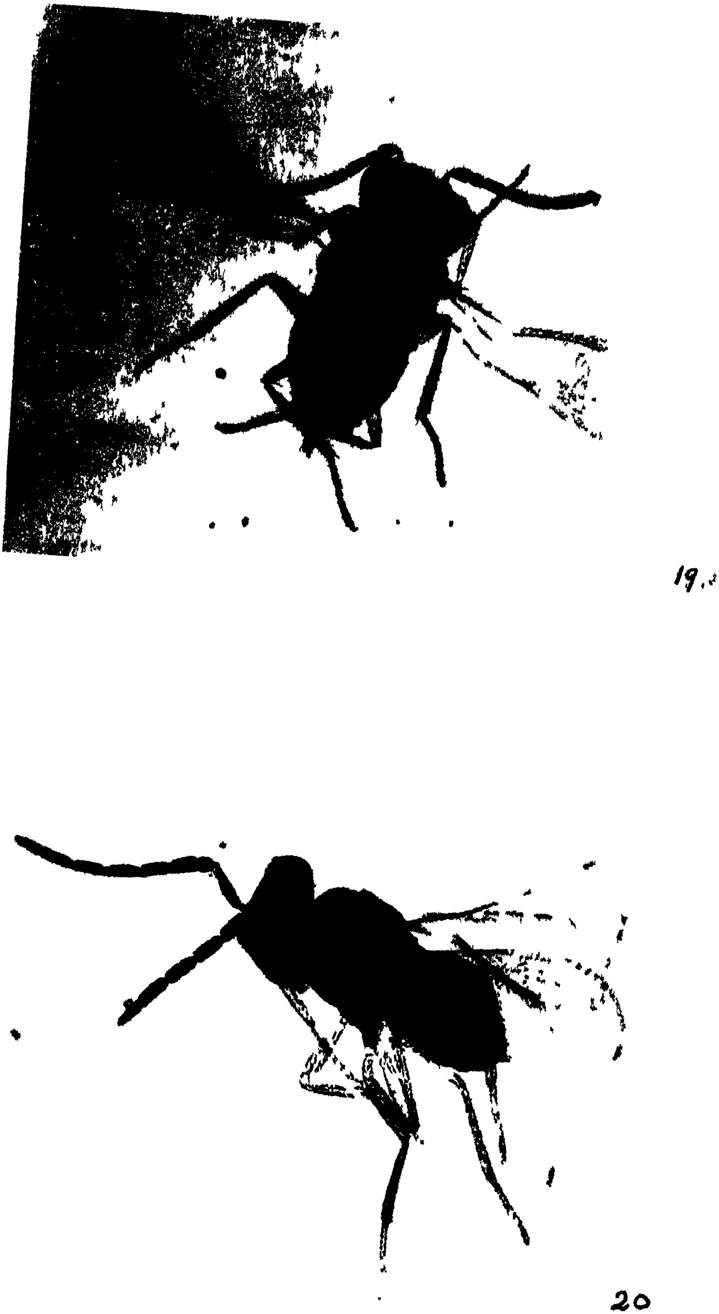


FIG 89—CHALCID PARASITE OF WHITE FLY (ENCARSIA FORMOSA Gahan)
(19) Female (20) Male Microphotograph × 60

[*To face p* 185

On the surface of the skin are prominent tubercles (fig. 88 (18)), the number and arrangement of which afford useful characters for separating the various species of White-fly from one another.

Long erect wax rods are secreted from glands on the dorsal surface, and with the appearance and development of the compound eyes, great growth both in length and thickness takes place, the scale becoming quite opaque.

With subsequent formation of the wing-cases, which grow downwards to the posterior extremity on each side within the pupal skin, and lastly of the imaginal rostrum and legs, which develop within the now useless pupal leg-cases, the adult fly is ready to emerge. Emergence takes place through a T-shaped crack in the thoracic region of the pupal skin, which is left behind upon the leaf (fig. 84 (5)).

The following periods of time are occupied in the various stages of development under normal glasshouse conditions in spring and summer:

Egg			10 days
Larva	First stage	6 days	13 days
	Second stage	3 days	
	Third stage	4 days	
Pupa			10 days
Total duration of life cycle			33 days

In all there are about five complete generations from May, when the adults usually enter the houses from outside, until October, when the adults of the last generation hibernate upon plants in the vicinity of glasshouses. If the latter are left stocked with plants during the autumn and winter, however, breeding will continue, but at a slow rate.

During the larval and adult life, honey-dew is almost continuously excreted from the vasiform orifice which is covered by the operculum. Rich in sugar, this excretion falls from above upon the upper surface of the plants upon which the insect is breeding. The black moulds which grow upon this substance cause the respiratory function of the leaf practically to cease, while in the case of the Tomato plant it becomes necessary to wipe the fruit before sending to market, a process entailing much labour and loss of time (fig. 92). It has been estimated that a sum of £30,000 was lost annually to the Lea Valley Tomato-growing industry before satisfactory means of dealing with the pest were put forward in 1920 by Dr. Ll. Lloyd at the Cheshunt Experimental Station.

II. Artificial Methods of Control.

(a) *Fumigation with "Cyanide."*

The most economical way of dealing with the infestations of White-fly in glasshouses is fumigation with hydrocyanic (prussic) acid gas.

The gas is generated by dropping one part by weight of sodium cyanide (98 per cent. purity) into glass jars placed at regular intervals upon the paths of the houses, each jar containing 4½ parts by volume of 33 per cent. sulphuric acid.

One-fifth to one-quarter ounce sodium cyanide gives off a quantity of gas into a space of 1000 cubic feet sufficient to kill all the adult flies and about 90 per cent. of the scale stages, but the eggs are not killed. A second fumigation is therefore necessary from a fortnight in warm to three weeks in cool weather after the first.

One-quarter of an ounce sodium cyanide to the 1000 cubic feet space is the maximum which can be used with safety upon most glasshouse plants, and as the gas is easily decomposed in the presence of light, it is essential to start a fumigation at dusk, and air the houses thoroughly by opening the doors and ventilators at dawn. While no further precaution than the latter is called for in the case of plants with coarse or leathery foliage, the tender foliage of the Tomato plant will not stand, without grave injury, concentrations of the gas sufficient to kill the scale stages of the insect unless water is withheld from the roots for a considerable time before fumigation: that is to say, the plants to be fumigated must actually require watering when fumigation is started. Moisture upon the foliage, however, is of no concern. Cucumber and allied plants which require water continuously will not stand fumigation with a greater concentration of gas than is obtained from one-eighth ounce sodium cyanide to the 1000 cubic feet space, an amount sufficient only to kill a good proportion of the adults, the eggs and scale stages being left alive.

In cyanide fumigation the first procedure is the measurement of each glasshouse to the nearest 1000 cubic feet capacity. This is obtained by the following formula:

$$\text{Length} \times \text{breadth} \times \text{average height} = \text{cubic capacity}.$$

$$\text{Average height} = \frac{\text{height to ridge} + \text{height to gutter}}{2}.$$

On large nurseries where blocks of houses sometimes covering half an acre of surface area require fumigation, the weighing out of cyanide for each jar entails much labour. Moulds of sodium cyanide each weighing one-half ounce have now been on the market for several years, so that weighing is no longer necessary. Another item which involves much time is the mixing of concentrated sulphuric acid to the required dilution of 33 per cent., owing to heat generated during the process.

Both on a large and a small scale it is now most economic to purchase the acid at the required dilution. Though prussic acid gas is extremely poisonous to man, there is no danger from the practice of cyaniding provided that ordinary precautions are taken. The sodium cyanide should never be wrapped in paper or cardboard before being dropped into the acid. The ventilators should be closed and a door left open; the cyanide charge is then dropped into the acid, and the operator leaves the house comfortably, closing and locking the doors. On opening up at dawn the ventilators should first be opened from outside, but if this is not possible, the door or doors should be opened for twenty-five to thirty minutes before any attempt is made to enter the house to open the vents from inside.

It is not advisable to cyanide conservatories which open immediately into or lean against dwelling-rooms.

In fumigating blocks of houses it is necessary to employ one operator to each house, all concerned starting at one end of the block on a given signal and leaving at the other end after dropping the placed charges into each jar.

The size of the charge for each jar varies with the width of the house as follows :

Width of House.	Charge of Cyanide to the jar.	Amount of 33 per cent. Acid to the jar.
Below 14 feet . .	¼ ounce	1 fluid ounce
14 feet to 20 feet .	½ ,,	2¼ fluid ounces
Above 20 feet . .	1 ,,	4½ ,,

It is inadvisable to fumigate on windy nights, as the gas is liable to become very unevenly distributed.

(b) *Fumigation with Tetrachlorethane.*

Tetrachlorethane is an aromatic liquid which is more convenient to employ as a fumigant than "cyanide," as the vapours are less poisonous to man. It is sufficient merely to pour it along the path of the glasshouse, taking care that the liquid does not come into contact with the plant roots. The special precautions demanded for the fumigation of Tomato plants with cyanide are unnecessary. Further, the vapours can be used with safety upon Cucumber and Melon plants.

The disadvantages of this fumigant are its high cost, about six times that of the materials required in cyaniding, and the greater danger to a number of glasshouse plants, particularly Chrysanthemum, Heliotrope, and certain varieties of Fuchsia and Pelargonium. The action of tetrachlorethane upon different varieties of Chrysanthemum is of great interest : the damage by leaf-scorch and especially by reduction in the number of flowers produced was originally supposed to be correlated with the colour of the flower, whites and yellows being less susceptible to injury than bronzes and pinks. Experiments upon a long series of varieties [7] show the supposition to be incorrect, and conclusions drawn from them incline to the view that the injury is due to a chemical action brought about by the distribution of some substance in the leaf or bud which reacts with the vapour. This substance is not distributed evenly in leaves of the same plant, but is situated according to the position of the leaf upon the plant of any one variety. The distribution of the substance is constant for any given variety to such a degree that, within limits, it is possible to name the variety according to the injury sustained after fumigation. It is true that the pink varieties have the substance most universally distributed to all parts of the plant, but in each class of colour at least one variety was found to be killed outright by the vapours.

In fumigating with tetrachlorethane in houses of mixed plants it is essential to see that susceptible varieties are removed during fumigation, and at any rate all Chrysanthemums (upon which the White-fly very rarely breeds) should be taken out of the houses.

Tetrachlorethane is valuable for fumigating Cucumber houses in cases of severe infestations which cannot be controlled by smaller doses of cyanide, and for small glasshouses adjoining dwellings. To kill the adult and scale stages 10 fluid ounces of the liquid to 1000 cubic feet are necessary, half the amount being sufficient to destroy the majority of adult flies only. As with " cyanide," the eggs are not killed by the fumigant, and a second fumigation is necessary to obtain complete control of the fly. The liquid is poured down the paths of the houses at dusk in a thin stream, and the ventilators need not be opened until several hours after sunrise. Special precautions as to watering are unnecessary.

III. RECENT MODIFICATIONS IN CYANIDE FUMIGATION.

Although the process of cyaniding Tomato houses on a large scale costs only about one penny for each 1000 cubic feet space in materials, the labour involved is considerable. This has led, especially in Germany, to the utilization of liquid hydrocyanic acid gas absorbed upon porous earth under pressure. Suitable quantities of the powder thus obtained are shaken from a graduated container upon the paths of the houses. By this process the hydrocyanic acid gas is given off rapidly into the atmosphere as with jar cyaniding, and rapid generation has distinct advantages in killing the scale stages of White-fly. On the other hand, few growers of Tomatos care to withhold water from their plants in June, a time when fumigation is most important in order to prevent subsequent severe infestation, to an extent sufficient to prevent some injury from the effects of the gas. Slow generation of the gas, while not giving quite so effective a control as the quick method, partly obviates the latter objection, and is certainly saving in labour, as one man can attend to the fumigation of some half-dozen houses in a block without inconvenience or danger. In the United States the method has been exploited to a large extent, and more recently, in Germany, zinc chloride has been employed to absorb the gas and give it off again slowly in the presence of moisture.

A very simple and cheap method of producing slow generation of the gas is the utilization of a thorough mixture of three parts by weight of sodium bicarbonate and one part by weight of powdered sodium cyanide. Carbon dioxide is liberated from the bicarbonate, and the carbonic acid derived from this reacts with the sodium cyanide.

Experiments with this mixture on a considerable scale [8] have given good results with a great saving in labour over the jar method, and no injury resulted to very soft plants. The best results were obtained by scattering the powder upon the paths of the houses at the rate of 1 ounce of the mixture to every 1000 cubic feet space.

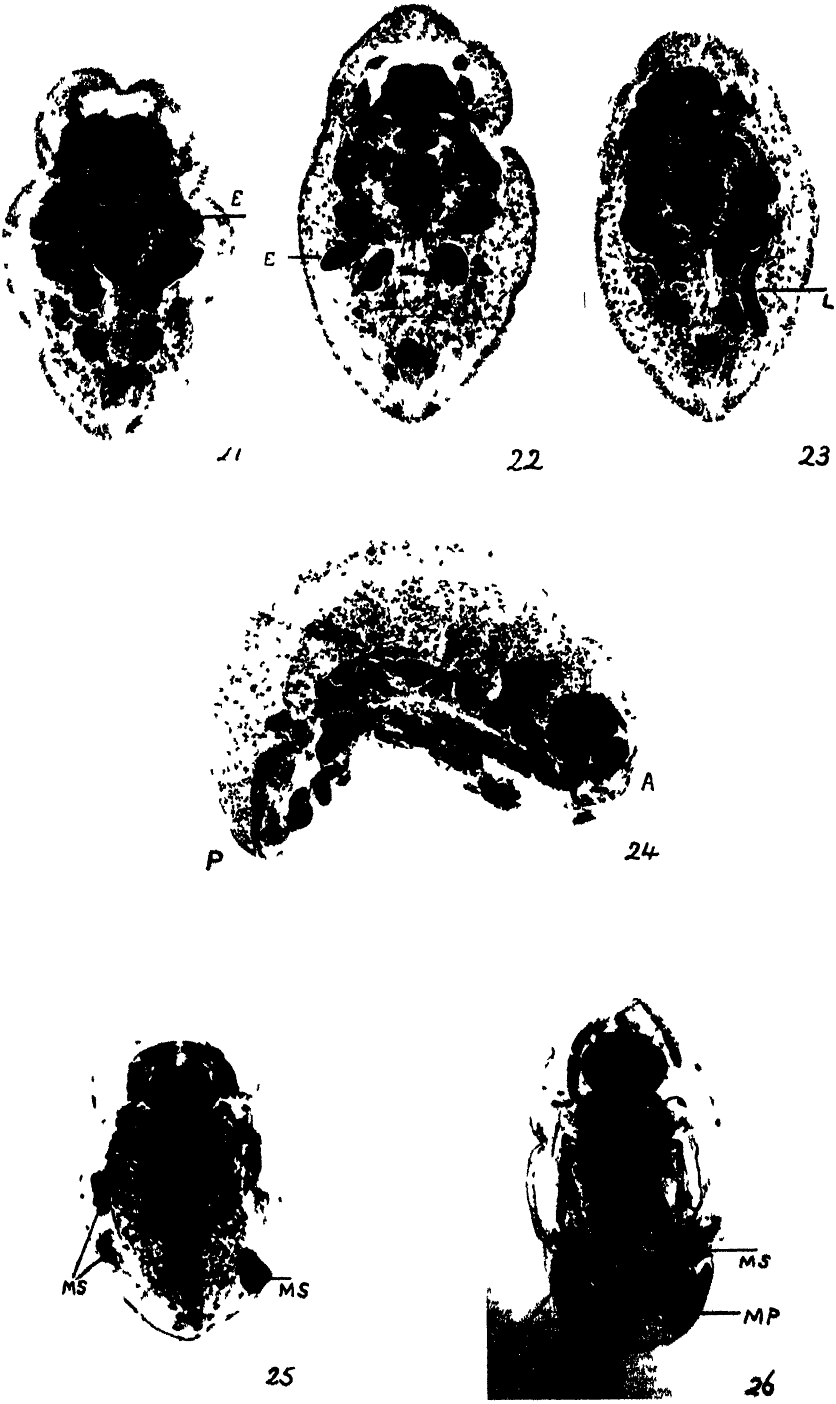


Fig. 90.—Chalcid Parasite of White-fly (Encarsia formosa)

(21, 22) Eggs in pupae (23) Young (24) Old larvae in pupa. (25) Pupa (26) Adult in pupal skin of White-fly

All × 60 For references, see p 192

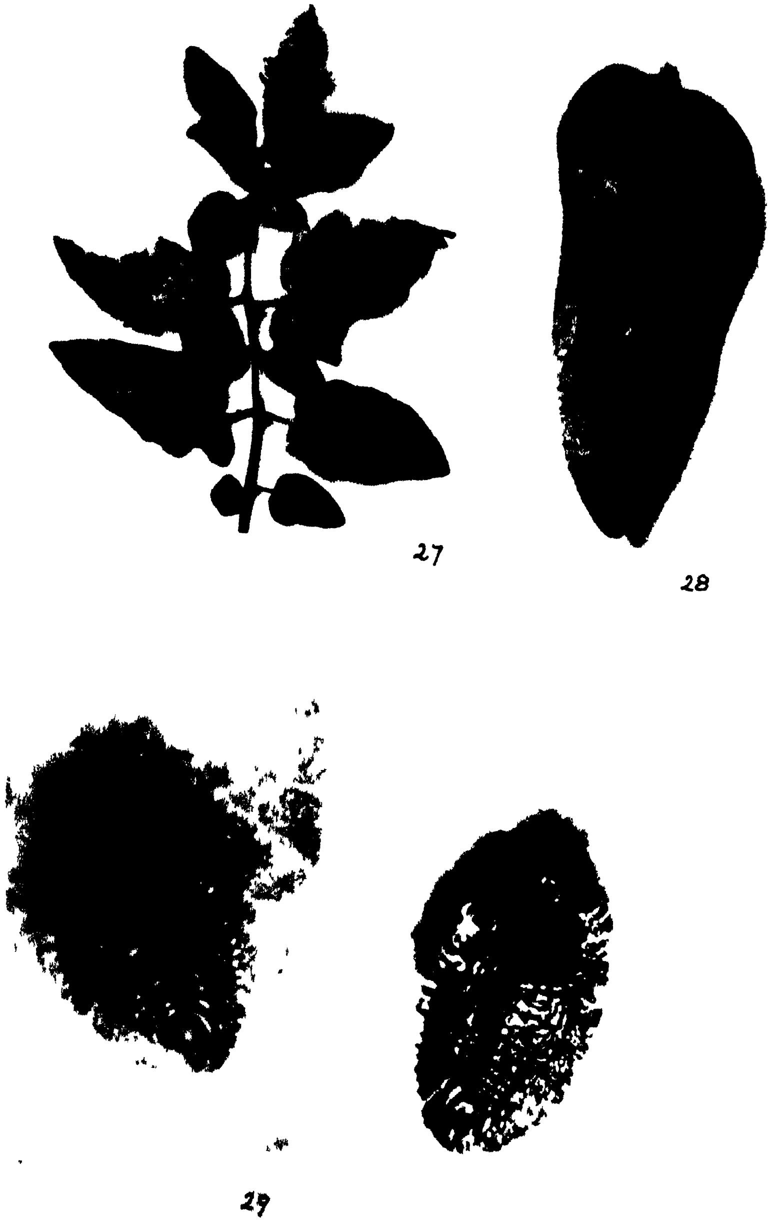


FIG. 91.—CHALCID PARASITE OF WHITE-FLY (ENCARSIA FORMOSA)

(27) Tomato shoot with black parasitized scales of White-fly × ¼. (28) Tomato leaf with black parasitized and white unparasitized pupae of White-fly × 1½. (29) Black parasitized pupa of White-fly × 40. (30) Pupal skin of White-fly after emergence of adult parasite × 40.

The plants should require water at the time of fumigation, but they need not be so dry in that region as is necessary to prevent injury in jar cyaniding.

Difficulty has been experienced in inducing manufacturers to place this powder upon the market, chiefly owing to lack of suitable machinery for grinding the cyanide.

IV. Biological Control (Figs. 89–91).

Until the year 1914, apart from one or two fungus parasites of doubtful value, no natural enemies of the White-fly were recorded in Great Britain, and it is probable that none was known to exist elsewhere. Since that year several closely allied genera of the family *Chalcididae*, belonging to the Order Hymenoptera, have been recorded as insect parasites of Aleurodids and Aphides in various parts of the world.

The first of these insects recorded as a parasite of the Greenhouse White-fly by Mr. Fox Wilson at the Royal Horticultural Society's gardens at Wisley, Surrey, in 1914, was probably *Encarsia partenopea* Musi, a second record from Cobham, in the same county, being made in 1921. This species, at any rate, was present at Wisley in 1926.

At the time of its first appearance, efforts were made by Mr. Fox Wilson and the late Professor Lefroy to distribute this parasite to growers of glasshouse plants, but it was lost sight of during the following year. It is probable, for reasons not clearly understood, that this species only increases to an extent sufficient to control the White-fly at irregular intervals: in Italy Silvestri found it parasitizing two Aleurodids, one of which, the Cabbage White-fly, is common in this country. In July 1926, Mr. L. Hawkins of Elstree, Herts, noticed that the scales of White-fly in a small greenhouse were turning black, and some of these black scales were received at the Cheshunt Experimental Station, through the Editor of the *Gardeners' Chronicle*, for identification. All but eight of the scales were empty, but from each of these emerged a minute Chalcid, *Encarsia formosa* Gahan, recorded first in the United States from Ohio in 1924. This species has since been found in Bermuda, where it exerts complete control of White-fly.

Only three of the specimens from Elstree survived, and though all eight were females, they were placed under a bell jar with a Tomato plant upon which White-fly was breeding. A fortnight later some of the White-fly pupæ upon the Tomato plant turned black, so that the insect was at once seen to be parthenogenetic. In all eighty-three parasitized scales were obtained, and the adult parasites emerging from them, together with a few more from Elstree, were liberated in a small glasshouse where Tomato and Potato plants were badly infested with White-fly in August.

During September some 2500 parasitized scales were available in this house for distribution to various houses at the Experimental Station. The adults emerging from these exerted a considerable control of the

White-fly during October, but with falling temperature males made their appearance, and it was realized that the White-fly and the parasite would have to be bred in a heated glasshouse during the winter in order to make certain of survival of the latter.

This was successfully carried out, so that a stock of parasites was available for early distribution in 1927. During March and April of that year the White-fly was entirely wiped out in Cucumber houses to which the parasite was distributed in comparatively small numbers, the conditions of these houses being especially favourable for the increase of this Chalcid wasp. Later successful results were obtained from distribution of the parasite to about a dozen Tomato nurseries, some 10,000 parasitized scales having been distributed from March to October.

In the latter month the parasite was located upon nurseries to which no distribution had been made, as far distant as three miles from the Experimental Station. From observations made during last winter, combined with cold-storage experiments at the new parasite laboratory near Slough, it is practically certain that the wasp cannot survive the winter outside, and the Empire Marketing Board has generously made a grant, whereby it has been possible to erect a special greenhouse in which the parasite can be bred in large numbers and carried over the winter successfully.

The number of parasites distributed to various parts of England and Wales, and including large consignments recently dispatched to Canada and the Channel Islands, from February 1 to July 1, is computed at not less than 140,000.

An account of the life history of the *Encarsia formosa* Gahan was published in March 1927 [9]. The minute female wasp measures less than one-fortieth part of an inch in length, and has a dark brown head and thorax, the abdomen being bright yellow (fig. 89 (19)). The male is rare and probably impotent, and is of a uniformly dark colour (fig. 89 (20)). Each female lays over fifty eggs, a single egg being deposited usually in the mid-intestine but sometimes near the mycetoma of a White-fly pupa, shortly after the White-fly third stage larva has moulted (fig. 90 (21 and 22)). The parasite egg hatches in about three days to an elongate white or yellowish larva (fig. 90 (23)), which begins to devour the White-fly pupa, the intact skin of which now quickly turns black (fig. 91). Occasionally, however, the pupal skin remains transparent so that the subsequent development of the parasite can be observed *in situ* from cleared preparations.

After moulting twice the larva (fig. 90 (24)) occupies nearly the whole of the empty skin of its host, and in about a fortnight from the time of hatching changes to the pupal stage after a third moult (fig. 90 (25)). Upon a final moult the wasp becomes adult, and after lying for some time in the still intact skin of the White-fly pupa, surrounded by the four skins cast during its life history (fig. 90 (26)), it cuts a hole in the roof of its prison and escapes (fig. 91 (30)). Emergence usually takes place towards the anterior end of the host, but sometimes the roughly circular hole is made round the operculum of the scale. The total length of the life history of the parasite is about one month, the White-fly scale turning black from eleven to fourteen days after the egg is deposited within it. The adult wasps are exceedingly active, and, in addition to jumping high from the leaf surface when disturbed, they are capable of making long flights even in windy weather, in spite of their delicate wings. Their food appears to consist solely of honey-dew secreted by the White-fly scale stages.

The foliage of some plants—notably Tobacco, Bouvardia, Datura, Abutilon, and Eucalyptus—appears to exert a repellent action upon the wasp, so that a high percentage of parasitized White-fly scales is seldom obtained upon these plants. Although this is unfortunate for the grower who happens to take an interest in them, the Tobacco plant, at any rate, has made it possible to keep up a large stock of White-fly in the parasite breeding house at Cheshunt, a necessity for the maintenance of the parasites.

The fly is bred in enormous numbers upon Tobacco plants, with which are grown small Tomato pot-plants. The latter become heavily infected with the host and are liable to an infection of well over 50 per cent. from the parasite, when these are either used for direct distribution of the parasite, or placed amongst large Tomato pot-plants, the lower foliage of which is stripped from time to time, packed in boxes, and distributed. On receipt of these shoots, upon which the parasitism often approaches or even exceeds 90 per cent. (fig. 91 (27) and (28)), the grower makes them into suitable bundles, which are hung up in infested houses for a period of three weeks to allow all the adult parasites to emerge.

In cases of severe infestation where immediate control of the White-fly is demanded, the glasshouses may be fumigated without injury to the parasite with " cyanide " gas, generated from one-eighth ounce sodium cyanide and one-half fluid ounce of 33 per cent. sulphuric acid for every 1000 cubic feet space. Sufficient gas is given off to kill most of the adult flies, leaving the scale stages alive for the parasite to breed in.

Five fluid ounces of tetrachlorethane to 1000 cubic feet space poured upon the paths of the houses will have a similar effect.

The value of the parasite, in addition to its effect in reducing the infestation of White-fly in Tomato and Cucumber houses, is especially pronounced where show plants are cultivated, as heat is usually kept on during the winter months and a supply of parasites is available when the adult flies invade the houses from outside during early spring.

In Tomato houses it is essential to place parasites as early as possible in spring if full benefit is to be derived later. If distribution is made at latest after the end of July the parasite cannot be expected to cope immediately with a severe infestation, especially as there appears to be a tendency for the egg-laying capacity of the female wasp to diminish at the end of September, when temperatures are low and the houses are seldom heated to any extent for the tail-end of the crop.

Literature Quoted in the Text.

[1] Lloyd, Ll.—"Control of the Greenhouse White-fly on Tomatoes," *Sixth Annual Report*, 1920, *Experimental and Research Station, Cheshunt, Herts*, pp. 16–26.

[2] Lloyd, Ll.—"The Control of the Greenhouse White-fly (*Asterochiton vaporariorum*), with notes on its Biology," *Annals of Applied Biology*, Cambridge University Press, vol. 9, No. 1, April 1922, pp. 1–32.

[3] Lloyd, Ll.—"Notes on Colour Tropism of *Asterochiton* (*Aleurodes*) *vaporariorum* Westwood," *Bulletin of Entomological Research*, London, vol. 12, Part 3, November 1921. pp. 355–359.

[4] Schrader, F.—"Notes on the English and American Races of the Greenhouse White-fly," *Annals of Applied Biology*, Cambridge University Press, vol. 13, No. 2, May 1926, pp. 189–196.

[5] Hargreaves, E.—"The Life-History and Habits of the Greenhouse White Fly," *Annals of Applied Biology*, Cambridge University Press, vol. 1, Nos. 3 and 4, January 1915, pp. 303–334.

[6] Imms, A. D.—"A General Textbook of Entomology." Methuen & Co., Ltd., 36 Essex Street, London, W.C. 1925.

[7] Speyer, E. R.—"The Effect of Tetrachlorethane Vapour on Chrysanthemums," *Eleventh Annual Report*, 1925, *Experimental and Research Station, Cheshunt, Herts*, pp. 107–109.

[8] Speyer, E. R., and Owen, O.—"The Fumigation of Tomato Houses with Hydrocyanic Acid Gas," *Annals of Applied Biology*, Cambridge University Press, vol. 13, No. 1, February 1926, pp. 144–147.

[9] Speyer, E. R.—"An Important Parasite of the Greenhouse White-fly," *Bulletin of Entomological Research*, London, vol. 17, Part 3, March 1927, pp. 301–308.

Reference to Lettering of Figures 12–18, 21–26.

Figs. 12–18.

A. Antenna.
B. Anterior breathing fold.
Bp. Posterior breathing fold.
CE. Compound Eye.
L. Larval legs.
La. Adult leg folds.
Li. Lingula.
M. Mycetoma.
Mi. Mid-intestine (four divisions).
O. Ocellus.
Op. Operculum.
S. Sucking organ.
T. Dorsal Tubercle.
W. Extremity of Wing Case.
WF. Wax fringe.

Figs. 21–26.

E. Egg of parasite.
L. Young larva of parasite.
A. Anterior end of parasite larva.
P. Posterior end of parasite larva.
MS. Moulted skins of parasite larva.
MP. Moulted skin of parasite pupa.

FIG. 92.—TOMATO PLANT SHOWING GROWTH OF MOULDS UPON THE HONEY-DEW SECRETED BY WHITE-FLY SCALES ON FRUIT AND FOLIAGE.

[*To face p.* 192.

THE GENUS DIERAMA, K. Koch and Bouché.

By N. E. BROWN.

DIERAMA is a very charming genus of Iridaceae. On account of its tall and slender habit and pendulous flower-spikes, it is the most distinct as well as the most graceful genus in the order, but it does not seem to be as widely cultivated as its merits deserve. Possibly this may be on account of its decided preference for damp situations, such as the margins of streams and marshy places, and the erroneous statement in books that there are only two species. I have reason, however, to believe that a few species grow in drier situations, and that probably most of them would prove to be nearly or quite hardy in the south of England and Ireland.

All the species are natives of South and Tropical Africa, but in the Floras of those regions BAKER has admitted but two species and one variety. However, upon examining the very same material that he worked with I find that the specimens he has placed under *D. pulcherrimum*, *D. pendulum* and its variety *pumilum*, belong to no fewer than fourteen different species, which, together with some others I have described below, bring the total number of species now known up to twenty-five.

Dried specimens of Iridaceae are generally very difficult to discriminate in words, because their flowers are so flimsy that often they do not admit of dissection, and such difference in colour or shape as living plants may possess generally disappears from dried specimens, yet (in Dierama) by making use of such evident characters as size of plant, arrangement, texture and colour of the bracts (the so-called " spathes " of books), size of the perianth and its parts, some of which are so conspicuous that it is impossible to understand how they could possibly have been overlooked, many distinctions may be found that are easily recognized and readily group the forms of Dierama into their various species, some of which are remarkably distinct.

The type of the genus is *D. pendulum*,* of which I have seen the type specimen. It is limited in its distribution and does not occur in Tropical Africa at all, but although it is stated to have been introduced into cultivation in this country as early as 1825, I cannot find that any figure of the true plant (see description to follow) has yet been published.

Most of the species enumerated below are perfectly distinct from one another and are easily recognized, but in a few cases the characters made use of to discriminate the species (such as the laxity of the flowers and size of their parts) have been found to vary slightly, and where this is the case the species is entered in the key in two or more places. *D. argyreum*, *D. dubium*, and *D. medium*, are undoubtedly closely allied to one another, although separable by the characters mentioned in their descriptions and in the key, yet possibly one or two may prove to be only varieties of one species, but at present it is quite unknown if or to what extent the character of the bracts and colour of the flower varies in the same species, and until these characters are definitely proven to be untenable by study of living plants in their native localities and by raising them from seeds, I deem it best to utilize them as of specific value.

---

* Usually the name is spelt *D. pendula*, but this is an error, as the generic name *Dierama* (funnel, in allusion to the shape of the flower) is neuter, not feminine.

In using the key the word perianth is intended to apply to the flower exclusive of the ovary, so that all measurements given do not include the length of the ovary.

KEY TO THE SPECIES.

1. Flowering-stems 4–10 inches high; leaves 2–6 inches long and less than ⅓ line broad; flowers apparently erect; perianth 6–9 lines long, pink. **25, trichorhizum.**
Flowering-stems 1–5 feet high; flowers pendulous, or possibly in one or two species erect. **2.**

2. Leaves 4–5 lines broad; bracts white, not speckled; perianth 10–11 lines long, pink. **12, latifolium.**
Leaves 1–3¾ lines broad. **3.**

3. Lobes of the perianth 9–15 lines long. **4.**
Lobes of the perianth 4–8 lines long. **10.**

4. Tube of the perianth 4½–7½ lines long; bracts 8–14 lines long. **5.**
Tube of the perianth 2–4 lines long; bracts 6–10 lines long. **7.**

5. Plant 3½–5 feet high; bracts membranous, whitish and speckled with small brown lines; leaves 1½–3 feet long. **6.**
Plant 2½–3 feet high; bracts firm, pale brown (or perhaps green when alive) with a dark brown band all round within the membranous margin; leaves 8–12 inches long. **3, insigne.**

6. Perianth 18–21 lines long, dark violet-purple. **1, pulcherrimum.**
Perianth 13–16 lines long, pink. **2, pendulum.**

Bracts membranous, entirely white without speckles; perianth apparently white or perhaps pale rosy. **24, argyreum** var. **major.**

7. Bracts membranous, speckled with small brown lines on a white or whitish ground; perianth 11–14 lines long. **8.**
Bracts thin or submembranous, entirely chestnut-brown or brown at the basal part and speckled on a pale brownish ground at the upper part. **9.**

8. Plant 1–2¾ feet high; spikes 2–6-flowered; perianth probably mauve or pink. **20, igneum.**
Plant 5 feet; spikes 5–10-flowered; perianth white. **10, elatum.**

9. Plant 1¼–2 feet high; spikes 2–3-flowered; bracts 5–9 lines long, shortly 3–4-toothed at the apex: perianth 9–11 lines long, "carmine"; South Africa. **16, pauciflorum.**
Plant 2–3 feet high; spikes 2–6-flowered; bracts 7–10 lines long, tapering into a long point; perianth 11–14 lines long, "light mallow-purple, slightly darker on centre of the petals at the back"; Tropical Africa. **17, vagum.**

10. Tube of the perianth 5–7 lines long; lobes 7–8 lines long; flower black or blackish violet. **11.**
Tube of the perianth 2–3½ lines long; lobes 4–8 lines long. **12.**

11. Bracts firm and uniformly brown (possibly green when alive) or with whitish margins; plant 4–5 feet high. **4. Davyi.**
Bracts membranous, thickly speckled with brown; plant 1½–2 feet high. **5. atrum.**

12. Bracts uniformly brown or dark chestnut-brown with pale veins. **13.**
Bracts, as viewed with a lens, speckled (sometimes densely) with small brown lines on a pale brown or white ground, or entirely white without speckles; perianth apparently pink, mauve or violet-purple. **14.**

13. Perianth 7 lines long, apparently white; plant 2½–2¾ feet high. **8, pumilum.**
Perianth 7–9 lines long, mauve or pale purple; plant 1–1¼ feet high. **15, cupuliflorum.**
Perianth 9–11 lines long, carmine; plant apparently 1¼–2 feet high. **16, pauciflorum.**

14. Spikes with the bracts overlapping (sometimes closely) so that the tip of each reaches to or above the base of the second bract above it (see also 20, *D. medium*, in which they occasionally do so). **15.**
Spikes somewhat lax, with the tip of the lower or of each bract usually not nearly reaching (but occasionally just reaching) to the base of the second bract above it; bracts always membranous. **21.**

15. Bracts with the basal part firm and uniformly light brown (perhaps green at the base when alive) and the veins not conspicuously paler, surrounded by a broad white membranous margin; perianth 8–9 lines long, mauve-pink; plant about 3 feet high. **6, rupestre.**

Bracts submembranous and not firm at the basal part, brown from densely crowded brown lines and linear specks between conspicuously pallid veins, surrounded by a white membranous margin; perianth 7–8½ lines long, drying violet-purple; plant 18–21 inches high. **7, pictum.**

Bracts membranous, with distinct awn-like points, pale brown on whitish, speckled with small brown lines. **16.**

Bracts membranous, acuminate or obtuse, white or whitish and with or without speckles of small brown lines. **17.**

16. Lobes of expanded perianth separated at the apical part and rounded at the tips; Griqualand East and Natal. **14, Tysonii.**

Lobes of expanded perianth apparently overlapping at the apical part and forming a somewhat truncate cup, the alternating lobes subtruncate at the apex; Transvaal. **13, Galpinii.**

17. Plants 4–5 feet high. **18.**

Plants 1½–3 feet high; bracts 6–10 lines long. **19.**

18. Bracts 9–11 lines long, rather obtuse, entirely white or whitish without speckling; perianth not seen fully developed, possibly pink; Mashonaland. **11, palustre.**

Bracts 8–9 lines long, acuminate, very finely speckled at the upper part only on a white ground, but see note under description; perianth apparently about 10–11 lines long, not dissectable, probably pink or mauve; Natal. **18, robustum.**

19. Bracts speckled with small and fine brown lines; perianth about 8 lines long, "pink." **9, Cooperi.**

Bracts entirely white or with a slight speckling at the base or along the midrib. **20.**

20. Perianth 7–8 lines long, drying blackish-violet or blackish-purple; bracts entirely white. **23, dubium.**

Perianth 8–12 lines long, apparently pale rosy or whitish; bracts entirely white without speckles. **24, argyreum.**

Perianth 7–10 lines long, drying pale mauve to blue; bracts white or speckled at the base or along the midrib. **21, medium var. Mossii.**

21. Bracts entirely white without any speckling, 6–10 lines long; perianth 8–10 (or in *D. argyreum* var. *major* 10–12) lines long. **22.**

Bracts speckled with brown or with only a speckled or a brown midrib on a white or pale brown ground, or sometimes almost uniformly brown. **23.**

22. Spikes 4–8-flowered; perianth apparently pale rosy or whitish; plant 1½–2½ feet high. **24, argyreum.**

Spikes 2–8-flowered; perianth drying mauve or blue; plant 2–2½ feet high. **21, medium var. Mossii.**

23. Plant 4–5 feet high. **24.**
Plant 1–2¾ feet high. **25.**

24. Leaves 1½–2 feet long; spikes about 6 to a stem, 2½–4 inches long; tips of the bracts usually not reaching to the base of the second bract above it; perianth apparently about 10–11 lines long, probably pink or mauve. **18, robustum.**
Leaves 3 feet long; spikes 3–4 to a stem, 2–2½ inches long; tips of the bracts about reaching to the base of the second bract above it; perianth about 9 lines long, lilac or bluish-mauve. **19, pansum.**

25. Bracts speckled on a white or whitish ground either only along the midrib or over most of the surface with small brown lines, sometimes so densely as to appear to the eye brown with white margins. **26.**
Bracts speckled on a pale brownish ground with small brown lines or entirely brown. **27.**

26. Spikes 2–9 (usually 5–9)-flowered; perianth 7–10 lines long, with lobes 5–7 lines long, "mauve" or "dark red." **21, medium** and var.
Spikes 3–7-flowered; perianth 6–7 lines long, with lobes 4½–5 lines long, mauve. **22, gracile.**

27. Perianth 9–10 lines long, apparently pink, with the lobes distinctly separated at the apical part and obtusely rounded at the apex; Griqualand East. **14, Tysonii.**
Perianth 7–9 lines long, "mauve," "lilac-rose" or "light blue," somewhat truncate at the mouth or top from the margins of the subtruncate lobes overlapping at the apical part; Tropical Africa. **15, cupuliflorum.**

1. D. pulcherrimum (by error *pulcherrima*), **Baker** in *Journ. Linn. Soc. Bot.* xvi. 99. Plant about 5 feet high. Leaves 5–6 to a stem, 2–2½ feet long, 3–3¾ lines broad. Spikes 6–9 to a stem, 3–7 flowered. Bracts usually 12–14 (sometimes 9–12) lines long, acuminate, membranous, whitish, speckled with small brown lines. Perianth 18–21 lines long, violet-purple; tube 5–6 lines long; lobes 13–15 lines long. Base of the anthers exserted about 3 lines from the tube.—Baker in *Fl. Cap.* vi. 88. Sparaxis pulcherrima, Hook. f. in *Bot. Mag.* t. 5555.

East London Division: Between the Keiskamma and Buffalo Rivers, ex *Bot. Mag.*! Kaffraria, on Mountains, *Mrs. Barber*, 38! Albany Division: without precise locality, *Cooper* 1527! Umtata Division: Bazeia, on Mountains, 2500–3000 feet alt., *Baur*, 430!

2. D. pendulum (by error *pendula*), **Baker** in *Journ. Linn. Soc. Bot.*, xvi. 99. Plant 3½–5½ feet high. Leaves 1½–3 feet long, 2–3 lines broad. Spikes 4–10 to a stem, 1½–4 inches long, 3–8 flowered. Bracts usually about 8 (but sometimes up to 12) lines long, acuminate, with the tip of the lower ones not reaching above and usually not up to the base of the second bract above it, membranous, whitish, speckled all over with small brown lines. Perianth 13–16 lines long, pink; tube 4–5 lines long; lobes 9–11 lines long. Base of the anthers exserted about 2½ lines from the tube.—Ixia pendula, Linn. f. *Suppl.* p. 91 (1781); Thunb. *Diss. Ixia*, p. 15 (1783). Watsonia palustris, Pers. *Syn.* i. 43. Sparaxis pendula, Ker in *Bot. Mag.*, under t. 1482. Dierama ensifolium, Koch and Bouché in *Walp. Ann.*, vi. 43.

Humansdorp Division: near Kromme River, *Thunberg*! Hoffmans Bush, *Fourcade*, 2797 ! Uitenhage Division: near Uitenhage, *Zeyher* 311 ! Albany Division: Assagay Bosch, *Burke* ! Along the rivulet at Grahamstown, *Burchell* 3529 ! Somerset Division: Boschberg, *MacOwan* 4500 ! Alexandria Division: Zuurberg Range, *Drège* ! Stockenstrom Division: Stormberg Range, *Zeyher* !

It is remarkable that no coloured figure of this beautiful plant has yet been published, although it is the oldest and best known species in the genus, for the figures quoted under this name (Lindley in *Bot. Mag.* t. 1360, Maund, *Botanist*, t. 62) belong to quite a different species, with blue or mauve-coloured flowers, while the flowers of the true *D. pendulum* are pink, very much larger and with lobes not so widely spreading as of those represented in the above quoted figures. I have examined the type of *Ixia pendula*, Linn. f. in Thunberg's Herbarium, and of *Dierama ensifolium*, Koch and Bouché, in Berlin Herbarium and find them to be identical; but the type of *D. ensifolium* has its flowers mostly aborted, perhaps from a deficiency of water. There are five flowers in bud upon it, and one flower that has opened is now partly destroyed by insects, the remainder of the flowers are evidently abortive, but there can be no doubt whatever that it is identical with *Ixia pendula*, Linn. f.

8. D. insigne, N.E. Br. Plant 2½–3 feet high. Leaves about 3 to a stem, 8–12 inches long, 1½–2½ lines broad. Spikes 3–4 to a stem, 2½–5½ inches long, 5–8 flowered. Bracts 9–12 lines long, with the tip of the lower usually not reaching above the base of the second bract above it, but sometimes extending above it and at others not attaining to it, firm and light brown (or perhaps green when alive) with a zone of darker brown separating the firm part from the membranous tip and margin. Perianth 17–19 lines long, mauve or bluish-mauve when dried; tube 7½–8 lines long; lobes 9–11 lines long. Base of the anthers exserted 3 lines from the tube.

Transvaal: Rayton, *Rogers* 12931, the type ! Rietfontein, Wakkerstroom, *Burtt-Davy* 4133 ! Ermelo, *Burtt-Davy* 3900 ! Carolina, *Rogers* 19146 ! Flowering November to January.

A well-marked species, easily distinguished from all others, except *D. Davyi*, by its large stout spikes, firm (not membranous) bracts, and large mauve-coloured flowers.

4. D. Davyi, N.E. Br. Plant 4–5 feet high. Leaves 3–4 to a stem, 6–18 inches long, 1½–2½ lines broad, rather stiff. Spikes 3–4 to a stem, 2–3 inches long, closely 6–11 flowered. Bracts 12–15 lines long, awn-pointed, with the tip of each reaching to above the base of the second bract above it, firm and uniformly brown (or perhaps green when alive) with narrow membranous, whitish and ragged margins. Perianth about 14 lines long, drying blackish-violet; tube 6–7 lines, lobes 7 lines long. Base of the anthers exserted about 3 lines from the tube.

Transvaal: Oshoek, *Burtt-Davy* 2719, the type ! Carolina, *Burtt-Davy* 2954 ! near O'Neil's Farm in Lydenburg District, *Wilms* 1444. Swaziland: Embabane, 4,000 feet, *Rogers* 11428 ! It flowers in December and January.

This is similar in habit to *D. insigne*, but differs by its firm bracts being entirely brown, and by the perianth having its tube and lobes of about equal length, and of a blackish-violet colour when dried. It is the only known species having the tube of the perianth as long as the lobes.

5. D. atrum, N.E. Br. Plant 18–24 inches high. Leaves 12–16 inches long, and about 2 lines broad. Spikes 2–4 to a stem, 1½–2½ inches long, 4–6 flowered. Bracts 9–15 lines long, acuminate, membranous, with the tip of each usually reaching to above the base of the second bract above it, whitish, speckled all over but more densely down the central area with minute brown lines. Perianth 12–13 lines long, "almost black"; tube 5 lines long; lobes 7–8 lines long, 3–3½ lines broad, obtusely rounded at the apex. Base of the anthers exserted about 3 lines from the tube.

Pondoland: Frequent in the grass-veld of Lusikisiki district, flowering in January, *Blenkison* in *Herb. Moss* 16033 !

This is distinguished from *D. Davyi* by its shorter stature and membranous bracts, and from the other blackish or dark violaceous species by the size of the flower and length of its tube.

6. D. rupestre, N.E. Br. Plant about 3 feet high. Leaves three on the stem seen, 10–12 inches long, 2–2½ lines broad. Spikes 4 to a stem, 1½–2½ inches long, densely 8–13 flowered. Bracts 6–7 lines long, each reaching to above the base of the second bract above it, with the basal half firm and brown, and with the apical part and the margins membranous and white. Perianth about 8–9 lines long, "mauve-pink," drying violaceous-blue; tube 3 lines long, and segments 5–6 lines long. Base of the anthers exserted ½ line from the tube.

Transvaal, Barberton Division: near Berlin, common among rocks on slopes by the Godwan River, flowering in January, *Davison* 82 !

7. D. pictum, N.E. Br. Plant 18–21 inches high. Leaves 8–9 inches long, 1¼–1¾ line broad. Spikes 4–5 to a stem, 1–1¾ inch long. Bracts closely imbricating, so that the tip of each extends to above the base of the second bract above it, 6–7 lines long, membranous, closely streaked with brown lines except at the broad white margins, with the slightly prominent pallid veins very conspicuous up to or beyond the middle. Flower 7–8½ lines long, drying violet-purple; tube 3 lines long, lobes 4–5½ lines long. Stamens with the base of the anthers exserted ½ line or less from the tube.

Transvaal: Lydenburg Division, at Pilgrims Rest, flowering in November, *Rogers* 14936!

D. pictum is very similar in general appearance to *D. rupestre*, but in *D. rupestre* the lower part of the bracts is firm and of a uniform pale brown or perhaps green colour when alive, while in *D. pictum* the bracts are membranous with the lower part densely streaked with brown between the pallid veins.

8. D. pumilum, N.E. Br. Plant 2½–2¾ feet high. Leaves about 3 to a stem, 4–12 inches long, ½–¾ line broad. Spikes 2–3 to a stem, 1½–2½ inches long, 5–9 flowered. Bracts 6–7 lines long, obtuse and ragged at the tip which about reaches to the base of the second bract above it, rather firm, dark brown, with pallid veins at the basal part. Perianth 7 lines long, apparently whitish or yellowish; tube 3 lines long; lobes 4 lines long. Anthers included in the tube. —*D. pendula* var. *pumila*, Baker, *Handbk. Irid.*, p. 160, and in *Fl. Cap.*, vi. 87, only as to the white-flowered plant mentioned.

Natal: Without precise locality, *Buchanan*!

This plant is so utterly distinct from *D. pendulum*, that it is difficult to understand how it could possibly have been associated with it. Although Baker has quoted several other collectors for his variety *pumilum*, the only sheet upon which he has actually written that name is that of the sheet of specimens collected by Buchanan. This sheet contained three specimens, two with white flowers and brown bracts (which, as they constitute the major part of the sheet I take as the type of *D. pendulum* var. *pumil m*), and one with blackish-violet flowers and pure white bracts, which is a different species, see *D. dubium*, N.E. Br.

The other specimens quoted under *D. pendulum* var. *pumilum* belong to *D. medium*, N.E. Br. and *D. argyreum*, L. Bolus.

9. D. Cooperi, N.E. Br. Plant 2½–3 feet high. Leaves 3–4 to a stem, 12–18 inches long, 1½–1¾ line broad. Spikes 6–8 to a stem, 1½–2½ inches long, 5–9 flowered. Bracts 6–8 lines long, acuminate, with the tip of each usually reaching to much above the base of the second bract above it, membranous, whitish, speckled (but not densely) with small brown lines, except at the margins. Perianth about 8 lines long, "pink"; tube 2½ lines long; lobes about 6 lines long. Base of the anthers exserted ¾–1 line from the tube.

Orange Free State: Near Harrismith, 5500–7000 feet, *Sankey* 289! and without precise locality, *Cooper* 876, the type!

As Mr. Cooper collected chiefly around Harrismith when in the Orange Free State, I have little doubt his specimen was from that locality.

10. D. elatum, N.E. Br. Plant "over 5 feet in height," only an imperfect specimen seen, consisting of three portions of leaves, the longest of which is 14 inches long, 2½–3 lines broad, and a few detached flower-spikes, which are 2–4 inches long and 6–10 flowered. Bracts 7–10 lines long, acuminate, becoming lacerated, membranous, speckled with small brown lines and dots on a white ground, very densely at the basal part, so as to appear dark brown there to the eye. Perianth 10–12 lines long, white; tube 2½–3 lines long, lobes 8–9 lines long. Base of the anthers exserted about 1 line from the tube.

Swaziland: Hlalikulu District, *Stewart* 10!

This is evidently a very distinct species, easily recognized by its tall habit and white flowers, but the material seen is very imperfect. It is allied to *D. Cooperi*, but is much taller and the flowers are of a different colour.

11. D. palustre, N.E. Br. Plant 4 feet or more high. Leaves 1½–2 feet long, 2¼–3 lines broad. Spikes about 7 to a stem, 2–4½ inches long, 4–9 flowered. Bracts 9–11 lines long, obtuse or subacute, with the tip of each sometimes reaching slightly above the base and sometimes not up to the base of the second bract above it, entirely membranous and whitish. Perianth only seen in bud and not exserted from the bracts and in that condition with the tube 3 lines long, possibly pink.

Mashonaland: Bulawayo and Matoppo Hills, on marshy land, *Appleton* 38!

12. D. latifolium, N.E. Br. Plant about 3½ feet high. Leaves 4–5 to a stem, 18–27 inches long, 4–5 lines broad. Spikes 7–9 to a stem, 2½–4 inches long, 5–12 flowered. Bracts 6–7 lines long, somewhat obtuse, very membranous, the tip of each not reaching above and often not up to the base of the second bract above it, entirely white, not at all speckled. Perianth 10–11 lines long, "pink"; tube 3–4 lines long; segments 8–9 lines long. Base of the anthers exserted about 1 line from the tube.

Natal: Inanda, *Wood* 1005!

This species is easily distinguished from all others described here by its broad leaves and white membranous bracts.

13. D. Galpinii, N.E. Br. Plant 1½–2 feet high. Leaves apparently 3–4 to a stem, 6–15 inches long and about 2 lines broad. Spikes 6–8 to a stem, 1½–2½ inches long, closely 8–11 flowered. Bracts 6–7 lines long, distinctly awn-pointed, with the tip of each usually reaching to much above the base of the second bract above it, membranous, appearing pale brown with a dark brown midrib and point, but under a lens the pale brownish membranous tissue is seen to be speckled with light brown small lines. Perianth 9 lines long, somewhat truncate at the mouth, "pink"; tube 3 lines long; lobes 6 lines long, the alternating ones subtruncately rounded at the apex. Base of the anthers exserted ¾ line from the tube.

Transvaal: Grassy mountain sides of the Saddleback Range, near Barberton, chiefly on the southern slopes, growing in tufts, 4,000–4,500 feet alt., flowering in September and October, *Galpin* 527!

14. D. Tysonii, N.E. Br. Plant probably 1½–2 feet high, no perfect specimen seen. Leaves 9–15 inches or possibly more long, 2½ lines broad. Spikes 4–7 to a stem, 1½–2½ inches long, 4–6 flowered. Bracts 6–8 lines long, often awn-pointed, each with the tip usually (but not always) reaching to or above the base of the second bract above it, membranous, pale brownish or whitish, thickly speckled with small brown lines. Perianth 9–10 lines long, apparently pink; tube 2–2½ lines long; lobes 7–7½ lines long, rounded at the apex but not subtruncately. Base of the anthers exserted 1–1½ line from the tube.

East Griqualand: On grassy mountain slopes near Kokstad, 4,800 feet alt., flowering in October, *Tyson* 1558 the type! and in *MacOwan and Bolus Herb. Aust. Afr.* 1201! Natal: South coast, *Harris* in *Herb. Moss* 13409!

This species and *D. Galpinii* are nearly allied, the difference being that in *D. Galpinii* the flowers are more crowded upon the spike, the bracts have longer awn-like points, and the perianth lobes are much more truncate and less separated at the apex than those of *D. Tysonii.*

15. D. cupuliflorum, Klatt, in Decken, *Reis. Ost-Afr. Bot.*, p. 73, t. 3 (1879). Plant 1–1½ feet high. Leaves 5–6 to a stem, 7–15 inches long, 1½–2½ lines broad. Spikes 1–5 to a stem, 1–2 inches long, 2–6 flowered. Bracts 6–9 lines long, more or less pointed, with the tip usually not nearly reaching to the base of the second bract above it, membranous, brown or appearing so from being densely marked with brown spots and lines. Perianth 7–9 lines long, by different collectors stated to be mauve, pale purple, lilac-rose and light blue; tube 1½–2½ lines long, lobes 5–6½ lines long, subtruncately rounded at the apex. Base of the anthers exserted 1–1½ lines from the tube.

East Tropical Africa: Kilimanjaro, 6,000–10,000 feet alt., *Decken and Kersten* 119, the type, *Johnston* 22! *Volkens* 983! The following also appear to belong here: Nyasaland, between Mpata and commencement of Tanganyika Plateau, 2,000–3,000 feet alt., *Whyte*! Nyika Plateau, 6,000–7,000 feet, *Whyte* 250!

16. D. pauciflorum, N.E. Br. Plant apparently 15–24 inches high. Leaves about 3 to a stem, 4–8 inches long, 2 lines broad. Spikes 2–3 to a stem, ¾–2 inches long, laxly 2–3 flowered. Bracts 5–8 lines long, shortly pointed, entirely chestnut-brown, with pallid veins. Perianth 9–11 lines long, "carmine"; tube 2 lines long; lobes 7–9 lines long. Base of the anthers exserted 1 line from the tube.

Orange Free State: Near Harrismith, *Sankey* 290!

This is nearly allied to *D. cupuliflorum*, Klatt, but differs by its leaves being shorter, proportionately broader and more shortly pointed, as well as having larger flowers.

17. D. vagum, N.E. Br. Plant 2–3 feet high. Leaves 2½–3 lines broad, a detached leaf with one specimen is 4 lines broad. Spikes 3–4 to a stem, 1–3 inches long, 2–6 flowered. Bracts 7–10 lines long, tapering to a moderately long point at the apex, thin, dark brown at the basal part, speckled on a pale brownish ground at the upper part. Perianth 11–14 lines long, "light mallow-purple, slightly darker on centre of petals at the back"; tube 2–3 lines long; lobes 8–11 lines long. Base of the anthers exserted ½–1 line from the tube.

Kenya Colony: Mount Elgon, common on wet grass lands, 10,000–11,000 feet alt., *Lankester*, the type! Mount Kenia, 8,000–9,000 feet alt., *Battiscombe* 24! Nyassaland: Milanji Plateau, *Johnston*! Tuchila Plateau, 6,000 feet alt., *Purves* 111!

This species, together with *D. cupuliflorum*, Klatt, was considered by Baker to be identical with *D. pendulum*, from which it is abundantly distinct in stature, bracts and flowers; while from *D. cupuliflorum* it differs by its height and much larger perianth, which has the segments separate at the tips, not overlapping at the edges as in *D. cupuliflorum* so as to form a truncate mouth to the flower.

From the allied South African *D. pauciflorum*, the acuminate bracts at once distinguish it.

18. D. robustum, N.E. Br. Plant about 5 feet high. Leaves 1½–2 feet long, 2–3½ lines broad. Spikes about 6 to a stem, 2½–4 inches long, laxly 6–11 flowered. Bracts 8–9 lines long when perfect, but often with broken points, long-pointed, with the tip of each usually not reaching to the base of the second bract above it, membranous, pallid or whitish, speckled at the upper part (not at the base) with minute brown lines. Perianth apparently about 10–11 lines long, but not dissectable, probably pink or mauve.

Natal: On the Drachensberg, *Cooper* 3177, the type! Probably specimens collected on the Noodsberg, *Rudatis* 1590, and at Van Reenans Pass, *Kuntze*, may belong here, but the bracts are speckled all along the midrib or nearly all over.

19. D. pansum, N.E. Br. Plant stated to be about 4 feet high, with leaves 3 feet long and 2–2½ lines broad, but possibly shorter in a wild state. Spikes 3–4 to a stem, 2–2½ inches long, 5–8 flowered. Bracts 6–7 lines long, acute or subacute and lacerated at the ends, with the tip of each about reaching to the base of the second bract above it, membranous, figured as pale brownish, but probably speckled with brown on a white ground. Perianth about 9 lines long, lilac or bluish-mauve; tube apparently about 2½ lines long; lobes 6–7 lines long, 3–3½ lines broad, elliptic, obtusely rounded at the apex. Base of the anthers apparently exserted about 1 line from the tube.—*Sparaxis pendula*, Lindley, *Bot. Reg.* t. 1360 (1830) and Maund, *Botanist*, v. 2, t. 62, not of Ker.

South Africa: Locality unknown. Introduced into cultivation in 1825, "by Mr. Tate of Sloane Street."

20. D. igneum (*ignea* by error), **Klatt** in *Abhandl. Naturf. Ges. Halle*, 1882, xv. 388; and reprint, Erganz, p. 54. Plant 1½–2 feet high. Only the basal part of the leaves present on the type, which are 1½–2 lines broad. Spikes 4–5 to a stem, 1–2½ inches long, laxly 2–6 flowered. Bracts about 7 lines long, tapering into rather long points at the upper half, membranous, somewhat fuscous to the eye, from being densely speckled with small brown lines on a whitish ground. Perianth 12–14 lines long, probably pink, there is no indication of its being "igneus" as Klatt states it to be; tube 3½–4 lines long; lobes 8–10 lines long. Base of the anthers exserted ¾–1 line from the tube.

Stockenstrom Division: Between Kat (either Kat River or Katberg) and Klipplaats River, *Drège* 3491!

The above description is made entirely from the type specimen, now in Berlin Herbarium. A specimen at Kew, distributed by Drège as "*Gladiolus pendulus b*" seems to be the same species, but differs from the type by having the bracts only 5–6 lines long and acute or acuminate, not with rather long points, by the perianth tube being 3–3½ lines long and the lobes 8–9 lines long, and by the base of the anthers being exserted only ½ line from the tube, all very trifling differences, and I have no doubt that it is specifically the same as *D. igneum*; this specimen is indicated as having been collected on the Katberg. A specimen in Herb. Rogers (no. 12676) from Cathcart Division also belongs here.

There are other specimens, however, which I am unable to distinguish specifically from *D. igneum*, although possibly in the living state they may be different. They only differ from the above description in the following particulars: Leaves 2–3 to a stem, 6–12 inches long. Spikes 2–4 to a stem, 1½–2½ inches long, laxly 3–5 flowered. Bracts 7–8 lines long, with the speckling of a brighter brown; perhaps from being less old. Perianth 11–12 lines long, mauve in dried specimens; tube 3 lines long, lobes 8–9 lines long. Base of the anthers exserted 1½ lines from the tube. The specimens are:

Stockenstrom Division: Katberg, *Scully* 145! Natal: Without precise locality, *Plant* 65 of 1852 (not of 1851) distribution! Basutoland: near Leribe, *Dieterlen* 254! Transvaal: Lydenburg Division, between Machadodorp and Waterval Boven, *Pole Evans*!

Until typical *D. igneum* and the above can be carefully compared in the living state and found to be distinct, the slight differences noted do not appear to me to justify their specific separation.

21. D. medium, N.E. Br. Plant 1½–2½ feet high. Leaves 2–3 to a stem, up to 21 inches long, 1½–2 lines broad. Spikes 2–6 to a stem, 1½–3 inches long, 2–9 flowered. Bracts 6–8 lines long, acuminate or occasionally obtuse or 3-toothed at the apex, with the tip of each usually not nearly reaching to the base of the second bract above it, or occasionally just doing so, membranous, speckled all over or along the central part with small brown lines on a white ground. Perianth 7–10 lines long, stated to be "mauve" and "dark red"; tube 2–3 lines long; lobes 5–7 lines long. Base of the anthers exserted ½–1 line from the tube.

Natal: Grassy slopes of the Berg, *Mudd*, the type specimen! Pieter Maritzburg, *Sutherland*! *Krauss* 265! Between Pieter Maritzburg and Greytown, *Wilms* 2289! Inanda, *Wood* 1359 Stanger, *Mason* and without precise locality

Gerrard 1830 ! Transvaal : Lydenburg Division, near Lydenburg, *Wilms* 1445 ! Machadodorp, *Rogers* 18187 ! Pilgrims Rest, *Rogers* 14170 ! Between Pilgrims Rest and Sabie, *Rogers* 23067 ! 23159 ! Barberton Division : Kaapsche Hoop, *Rogers* 21581 ! Mountains near Barberton, *Galpin* 433 ! Pietersburg Division : The Downs, *Rogers* 22078 ! And *Moss and Rogers* 284 from this locality appears to be a variety of this species.

var. Mossii, N.E. Br. Bracts very thinly membranous, white, without speckling, or occasionally speckled at the basal part or along the midrib. Perianth drying blue or dark mauve-blue, or occasionally pale rosy, possibly from fading.

Transvaal : Witwatersrand and Pretoria Divisions, at Premier Mine, *Moss* 4313 ! *Rogers* 24140 ! in a marsh at Florida, near Johannesburg, *Moss* 7160 ! Kloof east of Witpoortje Kloof, *Moss* 7964 ! damp situations at Roodepoort *Martin* in *Herb. Moss* 12098 ! Waterberg Division, at Elandsbosch, *Page* in *Herb. Moss* 15808 ! 15809 !

22. D. gracile, N.E. Br. Plant 14–20 inches high. Corm about 9 lines in diameter. Leaves apparently 3–4 to a stem, 6–9 (or perhaps when fully developed up to 12) inches long, 1–1½ lines broad. Spikes 2–4 to a stem, 10–20 lines long, 3–7 flowered. Bracts 4–6 lines long, shortly acute or subacute, or sometimes trifid at the apex, with the tip of the lower one sometimes reaching to the base of the second bract above it and sometimes not nearly doing so, membranous, light brown, from being thickly speckled with brown all over on a pallid ground. Perianth 6–7 lines long, funnel-shaped, apparently mauve with a dark purple mark at the base of some of the segments ; tube 2–2½ lines long ; lobes 4½–5 lines long, 2½ lines broad, elliptic, obtusely rounded at the apex. Base of the anthers exserted ½–¾ line from the tube.

Transvaal : Pietersburg District , Grassveld, Woodbush Mountains, flowering in September, *Moss* 15438 !

23. D. dubium, N.E. Br. Plant apparently about 2 feet high. Leaves not present. Spikes 5–6 to a stem, 5–7 flowered. Bracts 7–9 lines long, acuminate, usually with the tip of each reaching to or above the base of the second bract above it, but sometimes distant, membranous, entirely white. Perianth 7–8 lines long, blackish-purple or blackish-violet in the dried flowers ; tube 3–3½ lines long ; lobes 4–4½ lines long. Base of the anthers exserted ½ line from the tube.

Natal : Without precise locality, *Buchanan* !

This may be only a variety of *D. argyreum* with dark purple flowers, since it resembles that species in other characters, but until it is better known I think it advisable to consider it distinct, especially as it is so easily recognized by its small blackish-purple or blackish-violet flowers.

24. D. argyreum (by error *argyrea*), **L. Bolus**, in *Ann. Bolus Herb.*, iv. 42. Plant 1½–2½ feet high. Leaves 12–21 inches long, 1½–2½ lines broad. Spikes 3–5 to a stem, 2–3 inches long, 4–8 flowered. Bracts 6–10 lines long, acuminate in the type, obtuse in other specimens, with the tip of each sometimes reaching to above the base, at others not nearly reaching to the base of the second bract above it, membranous, white, without any brown speckles. Perianth 8–10 lines long, apparently white in the dried specimens, but described as pale rosy, spotted with white at the base of the segments ; tube 2½–3 lines long ; lobes 5½–7½ lines long. Base of the anthers exserted ¾–2½ lines from the tube.

Natal : Coast near Durban, *Wood* 311 ! and without precise locality, *Plant* 65 of 1851 (not of 1852) distribution ! *Sanderson* 278 ! *Mudd* 73 !

var. major, N.E. Br. Like the type in all characters but the perianth, which is 10–12 lines long, with a tube 2–2½ lines long, and lobes 8–9½ lines long. Base of the anthers exserted 2–2½ lines from the tube.

Natal : Krantz Kloof, *Rogers* 24627 !

Mrs. Bolus quotes no locality except that it comes from Natal, and no collector is mentioned, but I have no doubt that the above is the species she describes.

25. D. trichorhizum, N.E. Br. Plant 4–6 inches high, invested with a dense mass of fibres at the base. Leaves apparently about 3–4 to a stem, 2–6 inches long, very slender, less than ½ line broad. Flowering stem often not exceeding the leaves, very slender, filiform ; usually with only one, but sometimes with two flower-spikes, each 1–3 flowered. Bracts 4–5 lines long, apparently rather firm, brown. Perianth 6–9 lines long, "pink" ; tube 1½–2½ lines long ; lobes 4½–6½ lines long. Base of the anthers exserted 1 line from the tube.—*Morphixia trichorhiza*, Baker in *Journ. Bot.* 1876, p. 237 ; *Ixia trichorhiza*, Baker, *Handbook of Irideae*, p. 165.

Griqualand East : Eastern side of Zuurberg Mountains, 4,000 feet alt., *Tyson* 1567 ! Natal : Open ground around Chard, in Umvoti County, 4,000–6,000 feet alt., *Wood* 10030 ! near Port Natal, *Sutherland* !

This is one of the most distinct species in the genus, its very small size and slender linear-filiform leaves at once distinguish it from all other known species.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LI.—THE *p*H VALUE OF CELL SAP OF FLOWERS—I.

By B. H. BUXTON and F. V. DARBISHIRE, B.A., Ph.D.

PART I.

IN this JOURNAL, Vol. **52**, p. 46, we published a preliminary account of the relative acidity and alkalinity of the sap of variously coloured flowers. The provisional conclusions arrived at were, that with a few exceptions the sap of those flower groups in which blue is the predominant colour has an alkaline reaction, and in those with red as the predominant colour the sap is acid. Flower groups with predominant purple, or in which either blue or red petals indifferently may occur, tend to have a neutral reaction.

The preliminary tests were made with a universal indicator, but since then we have gone over the whole series again, using, with comparator, four individual indicators, ranging from *p*H 3·6 to *p*H 8·8, and find that, although the previously expressed views are in the main correct, yet there are more exceptions to them, especially in the red series, than we had at first suspected. In the present communication a summary of the results obtained by more accurate methods is given, together with a probable explanation of the exceptions.

The procedure was the same in every case. The petals were collected during the summer, partially dried at 25° C., and finished off in a desiccating chamber at room temperature. They were then ground to a fine powder and kept in specimen tubes stoppered with paraffined corks until wanted for testing during the following winter.

Objection may be taken that the organic acids might undergo some alteration during desiccation, thus rendering the observations unreliable. Since the drying temperature never exceeds 25° C., it seems unlikely that there can be any appreciable change, but to test this point some experiments have since been made with fresh petals and described in Part II. These experiments indicate that there is actually no appreciable difference in reaction between the dried and fresh petals.

Of the dried petals 1 gram was macerated overnight in 200 c.c. distilled water at *p*H 6·8–*p*H 7·0. The next morning it was filtered clear and the filtrate tested at once. This dilution was fixed upon empirically as the most convenient, since many of the darker shaded flowers are liable to colour more concentrated solutions too deeply for accurate observation.

The first test made at once never showed much change in the reaction from the water in which the dried petals had been macerated, *i.e.* from neutral. Usually the *p*H value ran between *p*H 6·4 and *p*H 6·7, irrespective of the colour of the flowers, or of the groups to which they belonged. It was rarely above or below this, and never less than *p*H 6·0 or above *p*H 7·0, with the single exception of Pelargonium —*p*H 5·7.

A little thymol is added to the extract to prevent growth of micro-organisms or moulds, and we have never had trouble with anything of this nature.

After standing a few days the clear filtrate becomes cloudy, the cloudiness increasing until, in three or four weeks, the particles sink to form a whitish-grey precipitate, leaving the supernatant fluid clear.

After three months the clear fluid above the sediment is decanted off and tested. By this time changes in the reaction are very marked; one series consisting mainly of blue groups, but including some of the reds, rises to about *p*H 8. Some of the red flower groups have become distinctly acid, at about *p*H 5, and the intermediate groups of purple and indifferently blue or red flowers usually show a reaction in the neighbourhood of *p*H 7·0. Over forty different flowers were tested in this way, and Table I gives twelve of them in detail, the others being given in a more generalized manner in Table IA.

TABLE I.

Flowers.	Colour of Extract.	Prevailing Colour of Group.	*p*H. At once.	*p*H After 3 Months.	Average.
Delphinium .	Blue	Blue	6·4	8·0	8·3 Blue group
Lupin . .	,,	,,	6·4	8·5	
Iris sibirica .	,,	,,	6·4	8·4	
Primrose .	,,	Blue or red	6·6	7·0	7·0 Intermediate group
Clematis .	Purple	Purple	6·5	7·0	
Iris Kaempferi	,,	,,	6·4	7·1	
Rhododendron	Red	Red	6·5	5·0	4·5 Red group
Pelargonium .	,,	,,	5·7	4·0	
Gentian .	Blue	Blue	6·5	4·4	8·1 Exceptions
Tropaeolum .	Red	Red	6·5	8·0	
Begonia .	,,	,,	6·2	7·9	
Salvia . .	,,	Blue or red	6·8	8·5	

In column 2 the initial colour of the extract is given, but the blue or purple colour quickly fades, leaving the extracts yellow or brown. The red colour, however, is usually persistent, remaining red throughout, even when the extract becomes distinctly alkaline.

In Table I are given the results in detail of twelve examples. The first three belong to typically blue flower groups, and the H^+ ion concentration runs to a little over *p*H 8·0 in three months. Then come three of the intermediate groups with purple or both blue and red flowers, with an end point of about *p*H 7, remaining practically the same as at the beginning. Nos. 7 and 8 belong to the red groups with a final H^+ ion concentration of about *p*H 5 or under.

The last four are given as exceptions to the general rule. The blue Gentian becomes very acid, while the red Tropaeolum and Begonia rise to about *p*H 8. Salvia, in which both blue and red flowers occur, belongs to the series referred to as intermediate and should not rise above *p*H 7 or thereabouts. Both blue and red Salvias, however, become distinctly alkaline and show an end point of over *p*H 8·0.

Table IA is a synopsis of all the tests made including the twelve given more in detail in Table I.

TABLE IA.

Approximate End Point.	Prevailing Colour of Group.	No. of Groups Tested.	No. of Tests.	Flowers Tested.
8·0	Blue	7	10	Lupin (blue, yellow, white). Delphinium (dark, pale), Campanula. Iris sibirica, Aconitum, Anchusa, Aquilegia (blue).
,,	Intermediate	3	4	Linum (red), Anemone (blue), Salvia (blue, red).
,,	Red	3	3	Poppy (Shirley). Tropaeolum, Begonia.
7·0	Blue	1	1	Viola.
,,	Intermediate	6	12	Anagallis (blue, red), Foxglove (yellow, white). Primrose (blue, red, yellow, white). Iris (purple, yellow), Primula Japonica, Clematis.
,,	Red	2	5	Papaver orientalis (dark and pale). Dahlia (mauve, red, yellow).
5·0	Blue	1	1	Gentian.
,,	Intermediate	1	2	Foxglove (purple, hybrid).
,,	Red	4	6	Pæony (dark, pale), Rose (red, white). Rhododendron, Pelargonium.
		28	44	

	*p*H. 8	*p*H. 7	*p*H. 5	
Blue	7	1	1	9
Intermediate	3	6	1	10
Red	43	2	4	9
	13	9	6	

It is evident that there are several of the predominantly red flowers which group themselves with the alkaline or intermediates, and if it is true, as we originally believed, that the anthocyanins are blue in neutral or alkaline, and red in acid media, it is not clear why the extracts from the red flowers should remain red even when the reaction is about *p*H 8.

A few rough preliminary tests of extracts from the dried petals are given here. The tests have since been made more accurately from fresh petals, and are given in detail in another paper. In a general way they confirm the preliminary observations on the dried petals.

TABLE II.

Change of Colour with Change of pH Concentration.

Approximate *p*H.		
Red Flowers.	*p*H 8–10.	*p*H 10–12.
Rose . . .	Blue	Green
Rhododendron .	Blue	
Linum . .	Blue	
Pelargonium .	Blue	
Pæony . .	Violet	Violet
Begonia . .	Yellow	Yellow
Papaver orientale .	Red	Red
Tropaeolum. .	Red	Red
Dahlia . .	Red	Red
Anagallis . .	Red	Red
Anemone fulgens .	Red	Yellow

Approximate *p*H.			
Blue Flowers.	*p*H 5·0.	*p*H 4·0.	*p*H 3·0.
Primrose .	Red		
,, dk. red	Red		
Clematis .	Red		
Dahlia (mauve)	Red		
Foxglove (purple)	Red		
,, (Hybrid)	Red		
Delphinium, dk.	Violet	Red	
,, pale	Blue	Red	
Aconitum .	Violet	Red	
Viola . .	Violet	Red	
Lupin . .	Violet	Red	
Anchusa .	Blue	Red	
Campanula .	Blue	Red	
Iris sibirica .	Violet	Red	
,, Kaempferi	Violet	Red	
Gentian .	Blue	Violet	Red
Salvia . .	Blue	Violet	Red

Table II shows that in some the red does not change to blue at all, or only in excess of alkali. Some of the blues and purples require more acid than others to change to red, and two of them, Gentian and blue Salvia, do not change to red until *p*H 3 is reached.

It is noticeable that the red extracts which become more alkali on standing, are precisely those which do not change to blue in alkaline media, while the resistant (to acid) blue of the Gentian is the only one of the blue groups which remains acid throughout in the extracts: about *p*H 4·5. It seems, therefore, that the red or blue colour in many cases is due to different forms of anthocyanin and not simply to the reaction of the sap, although the latter is probably the cause in some instances.

Between the first tests at once and the second after three months a few were taken at random, and it was found that here and there the reaction was more acid than at the beginning, even though the final test at three months might be in the neighbourhood of *p*H 8. For instance, say first test *p*H 6·5 and after three months *p*H 8, an intermediate test might show *p*H 5·5 or *p*H 6. To determine the reason for this apparent discrepancy a series was started and tested every week for twelve weeks in succession with the rather remarkable and quite unexpected results shown in Table III.

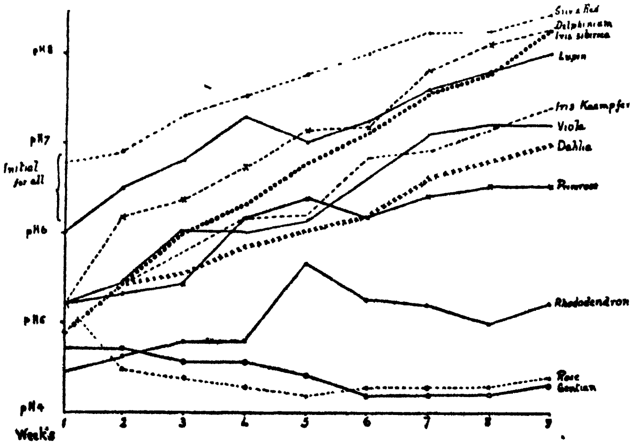
At the end of the first week the extracts have already become cloudy, and it is evident that there is a great increase in the acidity; after which some of the extracts show a more or less rapid increase of alkalinity until they reach about *p*H 8·0 in eight to ten weeks. Others rise more gradually to about *p*H 7·0 in the same time, and some show little or no rise, but remain strongly acid throughout. The red Salvia is the only extract which does not show initial increase of acidity.

TABLE III.

12 *Weekly Tests.*

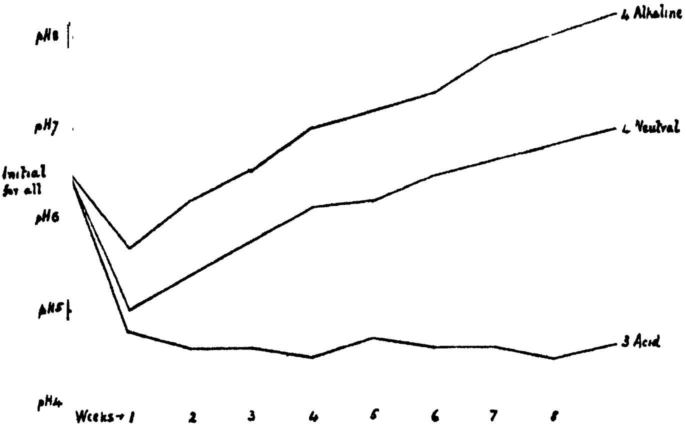
Weeks:	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Lupin	6·7	6·0	6·5	6·7	7·3	7·0	7·3	7·6	7·8	8·0	8·1	8·2	8·4
Iris sibirica	6·5	4·9	5·4	5·8	6·3	6·8	7·2	7·6	7·8	8·2	8·4	8·4	8·4
Salvia red	6·6	6·7	6·8	7·3	7·6	7·8	8·0	8·3	8·3	8·4	8·5	8·5	8·6
Delphinium	6·5	5·2	6·2	6·4	6·8	7·1	7·2	7·8	8·1	8·2	8·2	8·3	8·4
Average	26·3 6·6	22·8 5·7	24·9 6·2	26·2 6·5	28·0 7·0	28·7 7·2	29·7 7·4	31·3 7·8	32·0 8·0	32·8 8·2	33·2 8·3	33·4 8·35	33·8 8·45
Primrose	6·7	5·2	5·3	5·4	6·2	6·4	6·2	6·4	6·5	6·5	6·2	6·4	6·2
Viola	6·2	5·2	5·4	6·0	6·0	6·1	6·6	7·1	7·2	7·2	7·4	7·8	8·0
Iris Kaempferi	6·1	4·8	5·4	5·8	6·2	6·2	6·8	6·9	7·2	7·4	7·8	7·8	8·0
Dahlia	6·4	4·8	5·4	5·5	5·9	6·2	6·2	6·6	6·8	7·0	7·0	7·0	7·2
Papaver orientale	6·4	4·8	5·4	5·8	5·8	6·1	6·4	6·4	6·4	6·4	6·4	6·5	6·6
Average	31·8 6·4	24·8 5·0	26·9 5·4	28·5 5·7	30·1 6·0	31·0 6·2	32·2 6·4	33·4 6·7	34·1 6·8	34·5 6·9	34·8 7·0	35·5 7·1	36·1 7·2
Gentian	6·1	4·7	4·7	4·5	4·5	4·4	4·2	4·2	4·2	4·3	4·3	4·4	4·4
Rhododendron	6·7	4·4	4·6	4·8	4·8	5·6	5·3	5·2	5·0	5·2	5·2	5·6	5·7
Rose	6·6	5·2	4·5	4·4	4·3	4·2	4·3	4·3	4·3	4·4	4·4	4·4	4·5
Average	19·4 6·5	14·3 4·8	13·8 4·6	13·7 4·6	13·6 4·5	14·2 4·7	13·8 4·6	13·7 4·6	13·5 4·5	13·9 4·6	13·9 4·6	14·4 4·8	14·6 4·9

During the weekly tests the jars containing the extracts are well shaken up just before taking out the necessary quantity for testing, or there would be an undue amount of sediment left towards the end when there is little fluid remaining. The weekly shaking seems to accelerate the change in reaction somewhat, so that in twelve weeks several of the extracts have overshot the mark reached in three months when undisturbed. The end point of the three months' test is usually reached in the weekly tests after eight or ten weeks.



GRAPH I.—WEEKLY TESTS.

In the individual tests the three series group themselves together (see Graph I). *Papaver orientale* is excluded as there was some doubt about its accuracy. Individually the progression is rather irregular, more so than one would expect within the limits of error, but if the results are plotted fairly good and constant curves could be obtained on taking the average of a large number (see Graph II).



GRAPH II.—MEAN OF WEEKLY TESTS.

To find out just where the increase of acidity, noted in seven days, occurs, another series was taken and tested daily for a week with results shown in Table IV.

TABLE IV

Daily Tests.

Days:	0.	1	2.	3.	4.	5.	6.	7.	10.	14.
Primrose (yellow) . .	6 6	6·6	5·3	4·8	4·8	4·8	5·0	5·2	6·0	6 4
Anchusa	6·7	6·6	5·7	5·6	5 6	5·6	6·2	6·4	6·6	6·6
Viola	6·4	6·4	5·4	5·2	5·1	5·2	5·8	6·3	6·5	6 9
Primrose (blue) . . .	6·5	6·5	6·0	5·3	5 5	5·5	5·8	5·8	6·2	6·6
Rhododendron . . .	6·6	6·7	6·3	4·9	4·7	4·9	4·4	4·2	4·2	4·2
Clematis	6·2	5·8	5·0	4·8	4·7	4·6	4·5	4·4	4·4	4·7
Pæony	6·4	6·4	5·0	4·8	4·6	4·4	4·2	4·1	4·0	4·0
Foxglove (purple) . .	6·4	6·1	5·0	4·7	4·6	4·5	4·4	4·3	4·2	4·0
Totals . .	51·8	51·1	43·7	40·1	39·6	39·5	40·3	40·7	42·1	43·4
Average of 4 ascending .				5·3	5·3	5·3	5·7	5·9	6·3	6·6
Average of 8 . . .	6·5	6·4	5·5	5·0	5·0	5·0	5·0	5·1	5·3	5·4
Average of 4 descending .				4·8	4·65	4·6	4·4	4·25	4·2	4·2

During the first twenty-four hours the extracts remain perfectly clear and there is little or no change in the reaction. On the second day a faint cloudiness is just discernible, and there is a considerable increase of acidity. On the third day the extracts are markedly cloudy and the acidity has again increased. At this stage there is a separation into two groups, one remaining steady till the fifth day and then ascending; the other remaining acid and descending further, but more gradually. Clematis in the daily tests ranks itself with the acid group, but on the fourteenth day shows a tendency to rise, and would probably rise still further up to about *p*H 7, its end point in the three months' test. There was not enough material for a weekly test as well.

The cloudiness and subsequent sedimentation is due to spontaneous flocculation of protein matter, as has been shown by precipitation tests.

It seems probable that at first the salts in the extracts are adsorbed on the surface of the protein molecules or aggregates and have no effect on the indicators. It may be suggested that as the protein aggregates flocculate out with consequent decrease of surface area, the H^+ ions with their attendant anions are at first liberated to a greater extent than the K^+ (or other alkaline cations), and their attendant anions, the K^+ ions being liberated later and more slowly than the H^+ ions.

If, then, the K^+ ions are in excess of the H^+ ions the ultimate reaction will be more than *p*H 7·0, and if the H^+ ions are in excess it will be below *p*H 7·0. Two experiments so far made to test this hypothesis have not yielded any positive result, but the tests will shortly be made on a large scale.

It seems possible that adsorption of ions by proteins in colloidal solution may be the natural method of keeping the sap in the cytoplasm at a uniform *p*H value.

It has been mentioned that a weekly shaking of the extract sometimes has an accelerating effect on the changes in reaction. This is also true of a daily shaking, and Table V shows the effect in Viola extracts, in which the acceleration has been specially noticeable.

TABLE V.

	Days.		Weeks.			Months.	
	0.	5.	1.	2.	9.	3.	6.
	*p*H.	*p*H.	*p*H.	*p*H.			
Daily shaking .	6·4	5·2	6·3	6·9	—	—	—
Weekly shaking .	6·2	—	5·2	5·4	7·2	8·0	—
Undisturbed .	6·5	—	—	—	—	7·1	8·0

A somewhat analogous case is given by FREUNDLICH ("New Conceptions in Colloidal Chemistry," 1926, p. 63). If a colloidal CuO sol is flocculated by an electrolyte, the action proceeds much more rapidly if the solution is vigorously stirred.

Note.—If unbuffered distilled water is kept in an ordinary jar, such as those we used for the extracts, the alkalinity of the glass will cause the water to become slightly more alkaline. It is possible that the end point of the extracts must be scaled down to some extent on this account, but the scaling down in each case would be in the same direction, and would not change the relative positions on the graphs.

On the other hand, extracts at *p*H 8 can be diluted with unbuffered neutral water without any appreciable change in the reaction. They have buffered themselves to some extent, and one would therefore expect the slight alkalinity of the glass to have little effect. Curiously enough, however, extracts which remain distinctly acid do not appear to be buffered at all, as they cannot be diluted without change in the reaction.

A possible explanation seems to be that the anions in the acid extracts are for the most part strong acids, and in the alkaline extracts mostly weak acids.

In the first case, if one takes, for instance, as an illustration the anions to be the relatively strong oxalic, and in the second case the relatively weak acetic, then, even though the relative amounts of H^+ and K^+ ions may be the same in each extract; in the first, on liberation of the salts, an acid reaction with little or no buffering by the oxalates might result, and in the second an alkaline reaction with more or less buffering by the acetates.

To take a bird's-eye view of the situation:

First case: nH oxalate + $2n$K oxalate (neutral) = acid reaction. No buffering.

Second case: nH acetate + $2n$K acetate (alkaline) = alkaline reaction. Buffered.

It may be surmised, therefore, that there are two probable factors determining the relative alkalinity or acidity of the extracts.

A: Relative abundance of strong and weak cations; *e.g.* K and H.
B: ,, ,, ,, ,, ,, anions; *e.g.* oxalic and acetic.

In view of the fact that alkaline extracts become buffered, and acid ones do not, it seems probable that B plays the principal rôle.

In this connexion some observations of MICHAELIS[1] may be cited. In testing the adsorptive qualities of blood charcoal, he found that the stronger the acid the less readily is it adsorbed. MICHAELIS does not distinguish between the organic acids themselves, but classes them all together as being more readily adsorbed than the strong mineral acids, among which there are also differences according to their strength. But there are also differences in strength among the organic acids, and it seems reasonable to infer that they differ among themselves in the extent to which they can be adsorbed. Assuming such differences, and that adsorption by proteins follows the same lines as adsorption by charcoal, the early liberation of the stronger organic acids on reduction of surface area can be accounted for as a provisional hypothesis.

---

[*] Michaelis. Hydrogen Ion concentration. (*Trans. Perlzweig*, p. 235). Michaelis only tested organic dye acids, all of which are very weak acids.

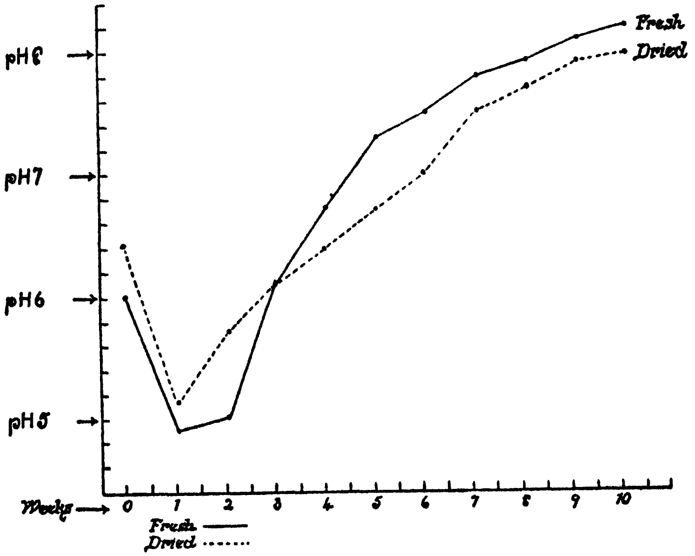
CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LII.—THE pH VALUE OF CELL SAP OF FLOWERS—II.

By B. H. BUXTON and F. V. DARBISHIRE, B.A., Ph.D.

THE experiments with dried flowers detailed in Part I. were made during the winter 1927–28. In the course of the summer of 1928 we have tested a number of fresh flowers by the following methods.

Ten grm. of fresh petals were powdered up in a mortar and filtered with the help of a vacuum pump. The filtrate was then tested with a B.D.H. capillator, but, since a comparator cannot be used with it, it was soon found that extracts of white flowers only could be satisfactorily tested, and those coloured with anthocyanin had to be excluded. The amount of extract which could be filtered through varied very considerably. From the less juicy petals, perhaps only about one c.c. or less could be obtained, and for the more juicy up to 5 or 6 c.c.



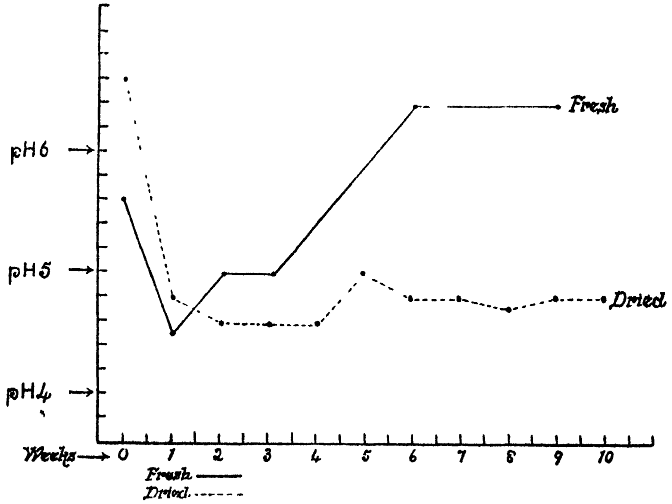
GRAPH I.—AVERAGE OF THREE ASCENDING (DELPHINIUM, IRIS SIBIRICA, VIOLA).

If sufficient extract was available, it was then diluted with neutral distilled water in the proportion of 1 to 25, and tested with a comparator in the same way as had been done with the dried petals.

Although it is not possible to judge if the diluted extracts from the dried corresponded with those from the fresh petals, yet the extracts from the latter ran through courses very similar to those from the dried petals. The initial reaction for the most part was somewhat more acid than with the dried material, but after a few days there was the same clouding and a great increase in acidity, followed by a rise as the particles sedimented out.

Graph I gives the averages of three, Delphinium, Iris sibirica, and Viola. The curves for the fresh and dried petals correspond very closely.

Graph II gives an average of two (Rhododendron and Rose) belonging to the acid series. In this case the acidity is less marked than with the dried petals, and there may have been a certain loss of alkali during the process of drying out, though not sufficient to vitiate the comparative results obtained with dried material. A more accurate method would be to take 20 grm. of petal, and dry out 10 grm., macerating each portion with the same amount of water. It is intended to make some tests on these lines next summer.



GRAPH II.—AVERAGE OF RHODODENDRON AND ROSE.

Of the few undiluted extracts from white flowers which could be tested directly with the capillator, all were found to be distinctly acid, quite irrespectively of the group colour, or whether they belong to an ascending or descending series.

	*p*H.
Rhododendron	4·0
Pæony	4·5
Poppy (Shirley)	4·5
Lupin	4·6
Rose	4·7
Aquilegia	4·8
Primrose	5·0
Iris Kaempferi	5·0
Campanula	5·5

PEARSALL* notes that the isoelectric point of vegetable proteins is in the neighbourhood of *p*H 3·5 to 4·5, and that growth proceeds most readily at *p*H values not far removed from this on the alkaline side. According to this view the *p*H values of 4·5 to 5·5 would be favourable for cell development. It is, however, puzzling to find such a high degree of acidity in extracts from blue flowers, since at *p*H 4 to 5 *in vitro* their anthocyanins are pink or violet, and have a clear blue colour only in the neighbourhood of *p*H7. One can only suppose that the acids in the living cytoplasm are adsorbed in some way, so that the actual reaction in the vacuoles, where the pigment is chiefly found, is more on the alkaline side.

---

* *Science Progress*, July, 1925, No. 77, p. 58.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LIII.—The Rhododendron White Fly.

By G. Fox Wilson, N.D.H., F.E.S., Entomologist.

Towards the end of May 1928 leaves of *Rhododendron Jacksoni* heavily infested with White Fly nymphs were received at the Wisley Laboratory from a Fellow of the Society residing at Ascot. The attack was so marked that it was thought advisable to obtain first-hand information on the infestation. A visit was paid to the garden in mid-June, when it was found that the adults were emerging from their pupal cases. A large bush of *Rhododendron ponticum*, on which had occurred the heaviest attack, had been cut down and burnt. Neighbouring bushes of the same species were examined, and on them White Flies were found, some at rest, others engaged in egg-laying. Some bushes of *R. Jacksoni*, growing about 20 yards away, were likewise severely damaged by the larvæ. So far as could be ascertained, the primary infection had arisen from those plants which had been purchased in 1925.

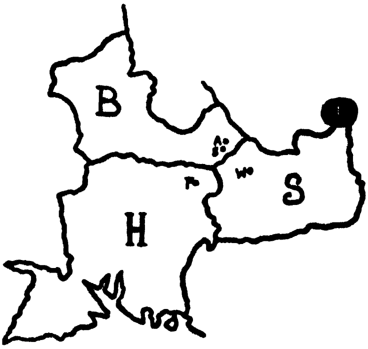


Fig. 93.—Counties of Berkshire, Hants, and Surrey, showing Present Distribution of Rhododendron White Fly.

The pest proved to be an Aleurodid (White Fly) distinct from any hitherto described species, and it has been placed provisionally in the genus *Dialeurodes* by Mr. F. Laing,* of the British Museum, who named it *D. chittendeni*, as a mark of respect to the Director of Wisley.

On the evidence obtained after a survey, made in the Ascot and Sunningdale districts, of gardens in which Rhododendrons are grown extensively, it was decided in July to issue a note of warning through the Horticultural Press to growers of Rhododendrons, so that they should make a diligent search of their plantations for the purpose of ascertaining whether the pest was present and, if so, to take immediate steps to exterminate it. It is feared that growers of these plants will have a pest to contend with more serious than the Rhododendron Bug, *Stephanitis rhododendri.*

---

* *Entomologist's Monthly Magazine*, vol. lxiv, October 1928, pp. 228–230.

We trust that the range over which the pest occurs (fig. 93) will be restricted and not widened as was the case of the Bug, which has been dispersed over the greater part of the country on plants sent from infected areas.

A large area on Netley Heath, which is situated on the North Downs in Surrey, was planted some years ago with *Rhododendron ponticum.* An extensive survey was made in this area on July 10, to ascertain whether the Rhododendron White Fly had reached the semi-wild plants. There was no sign of attack by White Fly or Bug.

The occurrence of a White Fly on Rhododendrons was first noted by Mr. A. H. HOARE, one of the Ministry of Agriculture's Inspectors, who detected a hitherto undescribed species on these plants at Chiddingfold, Surrey, in 1926.*

Susceptibility of Species to Attack.—So far as our observations go, only smooth-leaved species and hybrids are chosen as host plants. The most susceptible Rhododendrons appear to be *R. ponticum* and its varieties and hybrids. The resistant factor is apparently a physical one depending on the presence of hairs and thickness of the epidermal layer.

Symptoms of Attack.—The first sign of attack is a mottling of the older leaves, on the lower surface of which the larvæ feed. From April to June the upper surfaces of the leaves become drenched with vast quantities of honey-dew excretion, which provides a suitable medium for the growth of sooty moulds. LAING † records the presence of *Dematium pullulans* as occurring in large quantities on the matrix formed by the falling honey-dew.

Descriptions.—The descriptions given in this preliminary note of the various stages are necessarily brief. Further preparations of fresh material need to be made before complete descriptions are possible. Detailed descriptions of the pupa case and adult have been made by LAING.

The *Egg* is elongate-oval, smooth, and provided with a shallow stalk, which serves partly as an attachment for the egg.

The *Larva* is semi-transparent, elliptical, becoming rounder in the pupal stage.

The *Pupa Case* is transparent, white, and of a papery texture, 1·25 mm. long and from 0·90 to 0·95 mm. broad. The margin is furnished at wide intervals with strong, stoutish spines. The rudimentary legs and mouth parts may be distinctly seen.

---

* *Insect Pests of Crops,* 1925–1927, Min. of Agric. Misc. Publications, No. 62, 1928, p. 9.

† Laing, *loc. cit.*

The *Adult* is of a general colour which prevails in the family, that is, unspotted white mealy wings and yellow body. The wing expanse is 2·8 mm. and the length about 1·3 mm.

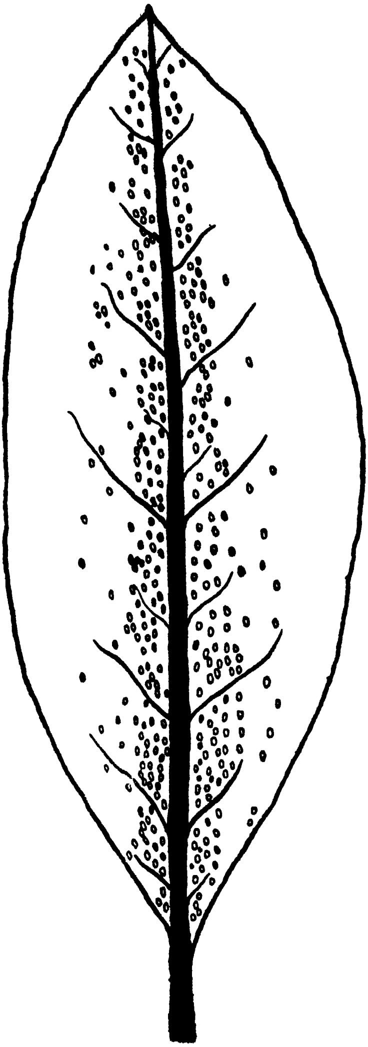


FIG. 94.—DIAGRAM OF RHODODENDRON LEAF SHOWING POSITION OF NYMPHS OF RHODODENDRON WHITE FLY ON LOWER SURFACE.

Life History.—Life history studies have not been completed, but the following notes are given for the information of growers. The best time to find the adults is from the end of June to mid-July. At that period they are found resting on the younger leaves of Rhododendrons in the attitude characteristic of members of the family *Aleurodidae*, with their two pairs of wings sloped over the body. When the

FIG. 95.—NYMPH OF RHODODENDRON WHITE FLY (*Dialeurodes chittendeni*) ON PORTION OF RHODODENDRON PONTICUM LEAF. (Nat. size)

[*To face p.* 217.

bush is shaken, the flies are disturbed and fly around, but speedily resettle on the foliage. At this time the females commence to lay eggs on the younger leaves. The eggs are laid singly, although the general manner of depositing the eggs by members of this family is in a circle or in an arc of a circle, but this has not been observed in this species. The eggs hatch in from eight to fifteen days. The young larvæ are at first active but, following their first moult, their legs become atrophied and the creature settles down to a sedentary life on the lower surface of the leaves. This surface often becomes thickly encrusted with them in the neighbourhood of the main vein (figs. 94 and 95).

The larvæ resemble those of many other species of Aleurodids, in that they quickly succumb when the leaf on which they are feeding is detached from the plant.

The species proved to be single brooded this year, but it is possible that there may be a second brood. This is suggested by the presence of pupæ on foliage in mid-September.

Control Measures.—There seems danger of this pest increasing to the same alarming extent as Tomato White Fly has done, and growers are therefore urged to keep a careful watch on their Rhododendrons and take immediate and drastic steps against an infestation.

With a first attack, the nymph-infested leaves should be hand-picked and destroyed.

It is advisable to examine the foliage of all smooth-leaved species and varieties prior to planting, particularly those coming from the infected zone.

The most satisfactory method of controlling this pest in plantations and shrubberies and on specimen plants is to spray the lower surfaces of the foliage, not neglecting the older leaves, with a highly refined emulsified oil which has been proved thoroughly effective against White Fly. It was found that when such an oil was used at 2 per cent. strength, complete control was effected. It is essential that the larvæ and pupæ should be wetted by the wash, which must be applied at a pressure of at least 90 lb. to the square inch. This pressure may be readily attained by using a pneumatic knapsack sprayer. Washes containing nicotine and derris were found to be less toxic to the immature stages of the insect.

I desire to express my thanks to Mr. F. C. Brown for the photograph illustrating this note.

THE AWARD OF GARDEN MERIT.—XIII.*

By F. J. CHITTENDEN, F.L.S., V.M.H.

101. CRATAEGUS × CARRIEREI.

Award of Garden Merit, December 8, 1925.

M. E. A. CARRIÈRE described this fine thorn in *Revue Horticole*, 1883, p. 108, and figured both flowers and fruits in colour. He tells us it was raised from seed of *Crataegus mexicana* (= *C. stipulacea*), a species to which it bears strong resemblance. It is a strong-growing, small tree producing its corymbs of numerous white flowers, each about an inch in diameter, in late May and early June. These are followed by rather large orange-red fruits at the end of summer, which usually persist for a considerable time and, together with the autumn-tinted bronzy red leaves, make the tree conspicuous and well worthy a place in the garden. The foliage is in summer deep glossy green, obovate elliptic, narrowed to the petiole, and unequally toothed in the whole upper part. It colours rather late and retains its colour well into the winter.

Ordinary soils suit it and it grows well in sand; it is vigorous, sturdy of habit, and perfectly hardy.

102. POLYGONUM AUBERTII.

103 POLYGONUM BALDSCHUANICUM.

Awards of Garden Merit, October 8, 1928.

Few climbing plants have, so far, had the Award of Garden Merit bestowed upon them, but here are two which fulfil all the qualifications that are connoted by that Award. They only want room to grow to be appreciated. They like good loam, an open sunny position, and a support such as an old tree to twine and scramble over, and nothing will more quickly fulfil the purpose its planting designed it to serve. Shoots as much as 20 feet long will be made in a season and a height of 40 feet may ultimately be reached. In general characteristics there is little to distinguish the two species. Their bare twisted pale stems form a close meshed network not unpleasing to see filtering the pale grey light in winter's short days, and in spring the pale green of their young stems and foliage is pleasing still, but their full glory waits till summer and autumn when the numerous panicles of small flowers appear in such abundance as to form a mass like a white or pink-tinged cloud enveloping the whole of the upper part of the plant. As the flowers pass over the sepals persist so that even in fruit the picturesque effect is not lost. Seed is rarely set by either species in this country.

---

* For earlier annotated lists see vol. **47**, p. 189; **48**, pp. 58 and 223; **49**, p. 233; **50**, pp. 100 and 260; **51**, pp. 84 and 337; **52**, pp. 82 and 254; **53**, pp. 110 and 325. (The notes on the first one hundred Awards are now collected in pamphlet form and may be obtained from the R H.S. Office, Vincent Square, Westminister, S.W.1.)

When these two plants are discussed in conversation and in print, first one is said to be the more handsome, then the other. The one thing agreed upon is their beauty, and the discussion leaves one in doubt as to whether the plants vary in degree of beauty according to their position in the garden, and possibly by that seedling variation which we are almost sure to see in every plant (as I suspect) ; or whether (as I fear) there is not some confusion in naming between the two in nursery and garden. For their real differences are slight and need seeking. The botanical characters that distinguish them are mainly in degree, but while *P. baldschuanicum* has broad panicles with smooth or nearly smooth stalks borne terminally on the branches and on branchlets, those of *P. Aubertii* are narrower, have scabrid stalks and are borne laterally along the upper part of the branches. In both the flowers are generally more or less tinged pink, but in *P. Aubertii* they are less often pink and may have rather a greenish tinge.

P. baldschuanicum, which is well figured in the *Bot. Mag.* t. 7544, was found and introduced to cultivation by Dr. ALBERT REGEL. It was collected on the banks of the River Wachsch in Bokara in 1883, and introduced to England *via* St. Petersburgh. *P. Aubertii* is a later comer, introduced in 1899 from seed collected by PÈRE AUBERT near Tachien-lu in Western Szechwan.

Both are related to the tuberous-rooted and more tender *P. multiflorum* from Hupeh and Formosa, which has a dense fringe of hairs on the branches of its inflorescence.

104. SEDUM SPECTABILE.

Award of Garden Merit, October 3, 1927.

When most herbaceous perennials are passing over and the long days of summer are gone *Sedum spectabile*, that noble plant, comes to its full beauty, and its flowers remain into October ; until, indeed, the time comes for the final tidying up of the border for the winter. Not only then, though then at its best, is *Sedum spectabile* worth its place, for through the summer its grey leaves may act as a foil to the harsh colours of some of the earlier flowers ; and when the ample heads of light purple open, the beauty of the border is enhanced not only by them, but by the brilliant butterflies that there resort. Peacock and Painted Lady, Tortoiseshell and Red Admiral, rest and feed there and open and close their wings in dreamy delectation. It is as much a butterfly plant as the Buddleia, which is just over.

Sedum spectabile is one of a family most of the members of which are plants of rocks and dry places, but not all. This is best in good soil, not too dry, in sun (but it will suffer partial shade). It is perfectly hardy and attains a height of a foot to eighteen inches. It is easily increased by division.

It has been in our gardens at least since 1868 and is a native of Japan (probably) and Central China (where it was found growing wild not long since), and has, as is only to be expected, been cultivated by the Chinese for a long time. There is a certain amount of variation among seedlings, two at least having been named, *e.g.* "Brilliant" and *atropurpureum* with darker flowers than the type and equally worth growing. There are good figures in Jordan and Fourreau t. 100 (1866), *Refugium Botanicum* t. 32 (1868), and Regel's *Gartenflora* t. 709 (1871), and it is interesting to note that already in 1871 the variety *atropurpureum* was known.

105. PRUNUS DAVIDIANA ALBA.

Award of Garden Merit, January 23, 1927.

The great genus Prunus includes a great number of species which can be arranged into certain fairly well-marked groups, so closely related, however, that many botanists consider it unwise to separate them into distinct genera. Others consider the facts would be better represented by giving distinct generic names to each of these groups. We find catalogue makers and horticultural authors follow some the one, some the other, and consequently many of the trees and shrubs of this genus (almost all of which are found in gardens) appear under at least two names in garden literature.

The groups are:

1. PRUNOPHORA with leaves rolled in the bud, including the blackthorn (*Prunus spinosa*), our common plums and damsons (*P. insititia* and *P. domestica*), the cherry plum (*P. cerasifera*), the apricot (*P. Armeniaca*), *P. mume*, *P. triflora*, and several other species, all of which are usually included under *Prunus*. The remaining groups have the leaves folded in the bud.
2. AMYGDALUS with sessile flowers and short calyx cups, including peaches and nectarines (*P. persica*), almond (*P. Amygdalus*; *P. communis* of some authors), *P. Davidiana*; all sometimes found under *Amygdalus* or *Persica*.
3. CHAMAEAMYGDALUS with tubular calyx cups and stalked flowers including *P. nana*, often found under *Amygdalus*.
4. MICROCERASUS with tubular calyx cup and stalks shorter than the fruits, including *P. tomentosa*, *P. prostrata*, and *P. incana*, all sometimes found under *Cerasus*.
5. CERASUS with short calyx cup and long stalked flowers in umbels or corymbs, including *P. pumila*, *P. japonica*, *P. humilis*, and cherries (*P. fruticosa*, *P. Cerasus*, *P. acida*, *P. Avium*), *P. subhirtella*, *P. serrulata*, and several others often found under *Cerasus*.

6. PADUS, deciduous with flowers in racemes, including *P. Padus*, *P. virginiana*, *P. serotina*, etc., often found under *Padus* or *Cerasus*.
7. LAUROCERASUS, usually evergreen, including the Portugal laurel (*P. lusitanica*) and the common laurel (*P. Laurocerasus*), often found under *Laurocerasus*, sometimes under *Cerasus* or *Padus*.

We give this list here as some guide to the understanding of catalogues, but it is to be hoped that before long some uniformity of usage may be reached among horticulturists as to the best generic name to use for garden purposes. There is bound to be difference of usage among botanists, for it is a matter of opinion as to where to draw the line between one genus and another.

It will be seen that the subject of this note, *P. Davidiana*, is related to the peach and the almond, from which it differs in having the calyx quite smooth. It forms a deciduous bush or small tree, 9 or 10 feet high, with smooth, fairly straight, greenish-brown shoots, leaves with stalks ½ to ⅝ inch long, and lanceolate blades up to 5 or 6 inches long and 1 to 1½ inch broad, sharply serrate, and with a blue-green tinge. There are two colour forms, one rose, the other and better one for the garden, the variety *alba* to which the Award is given (occasionally called also *P. Davidiana albiflora*). It is hardy in the south and mild parts of the country, but needs a sheltered place in bleak districts. Its great garden value lies in the flowers produced in February and March or in late years in April. The fruits are negligible and only about an inch in diameter.

Prunus Davidiana was introduced from China, and was first made known to gardens by M. CARRIERÈ, who described it in *Rev. Hort.*, 1872, p. 74, under the name *Persica Davidiana*.

106. PHACELIA CAMPANULARIA.

Award of Garden Merit, July 4, 1927.

Not many annuals have so far found a place in the select company of plants to which the Award of Garden Merit has been given, perhaps because so many of them vary to such an extent that it is difficult to define exactly the particular plant among these variations which is to be regarded as the best. *Phacelia campanularia* offers no such difficulty, for it is subject to but little variation. Its value lies in the large deep gentian-blue flowers, about an inch across, widely bell-shaped, produced (when the cultivation is good) over a long period. The plant is much branched and spreading, reaching a height of 6 to 8 inches. Its branches, clothed with stalked roundish hairy oblong leaves with crenate margins, terminate in a cyme and the flowers are marked inside by five small white spots at the divisions of the corolla. It is quite hardy, will grow in any ordinary soil in the sun, and may be sown in autumn or in spring where it is to flower. Like so many good annuals this is a native of California. It was found about San Bernardino and San Diego and introduced by Mr. THOMPSON of Ipswich, with whom it flowered in 1882 (see *Gard. Chron.*, n.s. xviii., pp. 20, 51). It was figured in the *Bot. Mag.*, t. 6735, from plants furnished by Mr. THOMPSON.

107. SCILLA SIBIRICA.

Award of Garden Merit, February 13, 1928.

Like all the Scillas, a bulbous plant needing planting in autumn, and then leaving to look after itself. It will be happy in the border, or among deciduous shrubs and is not particular as to soil so long as it is not dust-dry in the flowering season. It flowers later than *Scilla bifolia*, has usually more than two broader leaves which are green not tinged red as they come up, larger more open bell-shaped flowers, of a deeper harsher blue, borne from 1 to 3 on a green stiff stem.

Scilla sibirica has a wide distribution in Central and Southern Russia, Asia Minor, Caucasus and also still farther east, and it has had many names but the one we have used, bestowed by ANDREWS when he figured the plant in the *Botanical Repository* t. 365 in 1804, is the oldest. REDOUTÉ figured it in his *Liliaceae* t. 298 in 1809 under the name *Scilla cernua* and it is figured at t. 1025 in the *Botanical Magazine* as *Scilla amoena* v. *sibirica*, and indeed it is nearly related to *S. amoena*. There is a white form and a pink one, but the best, a very fine plant indeed, came to Wisley a few years ago as a gift from Messrs. VAN TUBERGEN of Haarlem under the varietal name *atrocoerulea*, and it has not failed to give a good account of itself each succeeding year in the border on the west of the Laboratory.

LACHENALIAS TRIED AT WISLEY, 1926–27.

LACHENALIAS are bulbous plants from the Cape, introduced to cultivation long since, yet strangely uncommon—this cannot be because their cultivation is difficult for anyone with a cool greenhouse, nor because these plants lack beauty and distinction; it can only be because they are not frequently before the public eye in any quantity, and because of some fear that they may fail to grow.

Those who have seen the collection at Wisley will have realized that they are capable of making a very fine display and that recent years have seen a remarkable development in them. This is very largely due to the work of that amateur of bulbous plants, the late Rev. JOSEPH JACOB, who sent many of his seedlings to the trial, and who had been at work crossing the best of the known species and selecting from the seedlings raised for many years. How sound his selection was, and how well his efforts at improvement were repaid, may be seen from the list of awards given below.

The cultivation of the Lachenalias in the trial from the time of their receipt until they were judged was in the care of Mr. J. WILSON, then Superintendent of the Fruit and Vegetable Department at Wisley, and we are indebted to him for the following notes on the treatment they received.

The bulbs were potted, five or six in a five-inch pot, in the middle of August. The drainage was ample, and the compost used was loam to which had been added a small quantity of decayed manure, a little leaf-soil, and sufficient sand to keep the compost open. The bulbs were covered with about an inch of soil. The pots were placed in a cold frame and shaded until growth was visible and up till then they received no water. As soon as growth appeared plenty of light and air was given and the pots remained in the frames until November, when they were removed to a cool house, standing the plants near the glass. After this they received very careful watering, plenty of air, and just enough heat to exclude frost. That is all that is required during winter. Some, the varieties of *Lachenalia pendula*, flower about Christmas, the remainder in March and April under these conditions.

The plants should be fed and watered generously when the soil is filled with roots until they show signs of going to rest, when feeding must cease and water must be gradually withheld. When all foliage has died down the pots should be stood upon a shelf in full sun and the soil should be allowed to become thoroughly baked until the time for repotting comes.

Descriptions of the species and varieties under trial and the list of awards made are given below.

AWARDS, DESCRIPTIONS, AND NOTES.

Flowers greenish.

GLAUCINA (Jacob).—9 to 10 inches. Foliage dark green, spotted with brown; flower stems with 30 to 40 flowers, crowded. Flowers ¾ inch long, ½ inch wide; petals pale greenish-white, tipped pale green. Flowering from April 10.

Flowers greenish-yellow.

LUTEOLA (Mauger).—9 to 11 inches. Foliage dark green, spotted with darker green; flower stems with 14 to 20 flowers. Flowers 1 inch long, ⅝ inch wide; outer petals pale greenish-primrose, tips green, base (when young) flushed bright red; inner petals pale greenish-primrose, tips green. Flowering from March 15.

CORK (Jacob).—5 to 6 inches. Foliage dark green, not spotted; flower stems with 8 to 10 flowers. Flowers 1 inch long, $\frac{3}{10}$ inch wide; outer petals pale yellow, tips greenish; inner petals greenish-yellow. Flowering from March 21.

RECTOR OF CAWSTON (Mauger).—5 to 7 inches. Foliage dark green, spotted dull red; flower stems with 6 to 9 flowers. Flowers 1 to 1⅛ inches long, ⅝ inch wide; outer petals pale primrose shaded green, when young base flushed red; inner greenish-yellow, narrowly edged deep carmine. Flowering from March 17.

TRICOLOR (Mauger).—5 to 7 inches. Foliage dark green, spotted with red; flower stems with 8 to 10 flowers. Flowers 1 inch long, ⅝ inch wide; outer petals pale yellow, tips green, when young base flushed red; inner greenish-yellow, edged dull crimson fading as the flower ages. Flowering from March 29.

Flowers yellow.

AWARDS.

Canada, A.M. March 25, 1927. Raised and sent by the late Rev. Joseph Jacob.

Arabia, A.M. April 8, 1927. Raised and sent by the late Rev. J. Jacob.

Siam, A.M. March 25, 1927. Raised by the late Rev. J. Jacob and sent by Messrs. Mauger, Guernsey, C.I. [**A.M.** 1924 (Jacob).]

Mandalay, A.M. April 8, 1927. Raised and sent by the late Rev. J. Jacob.

Tibet, A.M. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

Leiden, A.M. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

CANADA (Jacob), **A.M.**—7 to 9 inches. Foliage dark green; flower stems with 18 to 22 flowers. Flowers 1¼ inches long, ⅝ inch wide; outer petals pale primrose, tips greenish; inner pale greenish-yellow, tips recurved. Flowering from March 8. Increases rapidly.

ARABIA (Jacob), **A.M.**—6 to 8 inches. Foliage dark green, spotted with darker green; flower stems with 16 to 19 flowers. Flowers 1¼ inches long, ½ inch wide; outer petals primrose-yellow, tips green; inner primrose-yellow shaded green when young, tips green. Flowering from March 8.

NELSONII (Mauger, Carpenter).—7 to 8 inches. Foliage dark green, spotted with red, curled and twisted; flower stems 9 to 11 flowered. Flowers 1¼ inches long, ⅝ inch wide; outer petals bright yellow, base flushed red when young, tips green; inner bright yellow. Flowering from March 4.

SIAM (Mauger), **A.M.**—6 to 9 inches. Foliage dark green, spotted with darker green; flower stems with 16 to 22 flowers. Flowers 1¼ inches long, ½ inch wide; outer petals bright orange-yellow; inner bright orange-yellow with a very faint greenish tinge. Flowering from March 8.

MANDALAY (Jacob), **A.M.**—7 to 8 inches. Foliage dark green, spotted with darker green; flower stems with 15 to 18 flowers, widely spaced. Flowers 1¼ inches long, ½ inch wide, bright orange-yellow, tips greenish; base tinged scarlet. Flowering from April 6.

TIBET (Jacob), **A.M.**—6 to 9 inches. Foliage dark green, very faintly spotted with darker green; flower stems 9 to 18 flowered. Flowers 1¼ inches long, ½ inch wide, bright clear orange-yellow self. Flowering from March 4.

LEIDEN (Jacob), **A.M.**—10 to 13 inches. Foliage dark green, spotted with dark brown; flower stems with 12 to 16 widely spaced flowers. Flowers 1¼ inches long, ⅝ inch wide, bright rich orange self. Flowering from March 3.

Flowers yellow and red.

AWARDS.

Tipperary, A.M. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

Calcutta, A.M. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

Monaco, H.C. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

Goldfinch, H.C. March 25, 1927. Raised by the late Rev. J. Jacob and sent by Messrs. Mauger.

Monte Carlo, H.C. March 25, 1927. Raised by the late Rev. J. Jacob and sent by Messrs. Mauger.

Africa, H.C. March 25, 1927. Raised and sent by the late Rev. J. Jacob.

TIPPERARY (Jacob), **A.M.**—9 to 12 inches. Foliage dark green, spotted with darker green; flower stems with 8 to 10 widely spaced flowers. Flowers 1⅛ inch long, ½ inch wide; outer petals yellow, base flushed red, tips green; inner greenish with a broad dull crimson band at tips. Flowering from March 17. Increases rapidly.

SPA (Jacob).—8 to 10 inches. Foliage dark green, faintly spotted with dull brown; flower stems with 10 to 18 flowers. Flowers 1⅛ inch long, ⅜ inch wide; outer petals bright pale yellow, base flushed red, tips green; inner bright pale yellow, margins bright red. Flowering from February 24.

MONACO (Jacob), **H.C.**—8 to 11 inches. Foliage dark green with large dark green spots; flower stems with 8 to 10 flowers. Flowers 1 inch long, ½ inch wide; outer petals bright yellow, base flushed scarlet, tips greenish; inner, as outer, but margins broadly edged deep carmine-scarlet. Flowering from March 22.

GOLDFINCH (Mauger), **H.C.**—7 to 9 inches. Foliage dark green, spotted darker green; flower stems with 12 to 15 flowers arranged in pairs. Flowers 1⅛ inch long, ½ to ⅜ inch wide, dull yellow, margins broadly edged bright red. Flowering from March 8.

MONTE CARLO (Mauger), **H.C.**—7 to 10 inches. Foliage dark green, spotted with darker green; flower stems with 15 to 22 flowers. Flowers 1¼ inch long, ⅜ inch wide; outer petals bright orange-yellow, base flushed red, tips greenish; inner orange-yellow, margins with a broad red band. Flowering from March 4.

AFRICA (Jacob), **H.C.**—9 to 12 inches. Foliage dark green, spotted with darker green; flower stems with 16 to 19 flowers. Flowers 1¼ inch long, ⅜ inch wide; outer petals orange-yellow, base flushed red, tips greenish; inner orange-yellow, tips broadly margined crimson. Flowering from March 3.

CALCUTTA (Jacob), **A.M.**—9 to 11 inches. Foliage dark green, faintly spotted with darker green; flower stems with 12 to 16 flowers widely spaced. Flowers 1 to 1¼ inch long, ⅜ inch wide; outer petals rich orange, tips greenish; inner rich orange, tips broadly edged purplish-crimson. Flowering from March 3.

Flowers vermilion.

AWARD.

Boundii, A.M. January 25, 1927. Raised and sent by Messrs. Bound of Redhill, Surrey. [**A.M.** 1915 (Bound).]

BOUNDII (Bound), **A.M.**—12 to 14 inches. Foliage dark green, little spotted with dull red; flower stems with 28 to 35 flowers. Flowers 1¼ inch long, ⅜ inch wide; outer petals bright vermilion tinged bluish towards the tips, tips pale green; inner shaded bluish towards the margins, tips green, somewhat protruding. Flowering from December 15.

PENDULA SUPERBA (Mauger).—Much like 'Boundii,' but somewhat dwarfer and the flowers 1 inch long; the inner petals protruding more than in 'Boundii' and shaded bluish. Flowering from December 20.

PENDULA (Mauger).—Much like 'Boundii,' but somewhat dwarfer, the inner petals protruding more than those of 'Boundii' and less than those of 'Pendula superba.' Flowering from December 20.

DAHLIAS TRIED AT WISLEY, 1928.

The trial of Dahlias has been continued in the Society's Gardens along the lines followed in previous years, and frequently described in earlier reports.

In 1928 forty-five new varieties which had been selected for trial at Vincent Square in 1927 were planted at Wisley, and judged on September 13. A sharp frost destroyed all on the night of September 30. The awards recommended are shown below, and descriptions are given of all the varieties not previously described.

A variety was given H.C. in 1927 (see Journal, vol. 53, p. 167) under the name 'Thomas Moore.' This name was an error, and the variety is 'Red Riding Hood'; it is also known as 'Roodkapje,' and under both names it has been grown in the trials.

The arrangement followed below is that of previous reports.

AWARDS, DESCRIPTIONS, AND NOTES.

Class II. Mignon Single Dahlias.

Yellow.

Seedling, No. 57 (Dawkins).—20 inches. Flowers 4½ inches diameter; lemon-yellow; free on 4- to 6-inch stalks, well above foliage. Much like 'H. J. Jones' in habit, but with flowers a shade paler, the margins of rays have a faint reddish tinge on the reverse, becoming more pronounced with age.

Scarlet.

Seedling, No. 41 (Dawkins).—16 inches. Flowers 3½ inches diameter; rich scarlet-crimson; free on 4- to 6-inch stalks, well above foliage. Of less compact habit than 'Coltness Gem' and flowers of a darker shade.

Class VII. Small-flowered Paeony-flowered Dahlias.

Awards.

Mermaid, A.M. September 13, 1928. Raised and sent by Messrs. Cheal of Crawley, Sussex.

Seafield, A.M. September 13, 1928. Raised and sent by Messrs. Dobbie of Edinburgh [H.C. 1922].

Pink Perfection, A.M. September 13, 1928. Raised and sent by Messrs. Cheal.

Ruth, A.M. September 13, 1928. Raised and sent by Messrs. J. Burrell of Howe House Nurseries, Cambridge [H.C. 1927].

Topaz, A.M. September 13, 1928. Raised and sent by Messrs. Cheal.

Mrs. A. S. Galt, A.M. September 13, 1928. Raised and sent by Mr. A. J. Cobb of Reading University.

The Bishop of Llandaff, A.M. September 13, 1928. Raised and sent by Messrs. Treseder of Cardiff.

Apoldro, A.M.—September 13, 1928. Raised and sent by Messrs. J. G. Ballego of Leiden, Holland.

White.

Sandra (Turner).—4 feet. Flowers 3½ to 4 inches; white with lemon centre; free, erect, on 6- to 12-inch stalks, well above foliage.

Yellow.

Mermaid (Cheal), A.M.—4½ feet. Flowers 4 to 4½ inches; bright clear lemon-yellow; free, erect, on 6- to 12-inch stalks, well above foliage.

POLLY (Matlock).—3 feet. Habit very compact. Flowers 3 to 3½ inches; dull dirty lemon-yellow, with a faint brownish flush; free, on 4- to 10-inch stalks, well above foliage.

Pink on Yellow.

SEAFIELD (Dobbie), **A.M.**—Described R.H.S. JOURNAL, vol. 48, p. 104. This variety was placed amongst the Star Dahlias, but fits best here.

Pink.

ELLA (Burrell).—3½ feet. Flowers 4 to 4½ inches; bright pale flesh-pink, base lemon; free on 6- to 9-inch stalks, well above foliage.

PINK PERFECTION (Cheal), **A.M.**—4½ feet. Flowers 3 to 3½ inches; bright rose-pink, base zoned crimson; free, erect, on 9- to 12-inch stalks, well above foliage.

Pale Rose.

RUTH (Burrell), **A.M.**—Described R.H.S. JOURNAL, vol. 58, p. 171.

Rosy-magenta.

MARMOT (Stredwick).—4 feet. Flowers 4 to 4½ inches; dull rosy-magenta, base yellowish; ragged; free, on 6- to 12- inch stalks, well above foliage.

Salmon.

TEENY (Stredwick).—3½ feet. Flowers 3 inches; bright salmon-cerise, base coral red, tips white, free, on 4- to 6-inch stalks, above foliage.

MRS. KENNETH WEBB (Treseder).—3½ feet. Flowers rich salmon-orange; free, erect, on 6- to 12-inch stalks, well above foliage; foliage purplish-brown.

Scarlet.

TOPAZ (Cheal), **A.M.**—4 feet. Flowers 3 to 4 inches; bright orange-scarlet; free, erect, on 6- to 14-inch stalks, well above foliage.

ZULU (Cobb).—3½ feet. Flowers 4 to 4½ inches; bright orange-scarlet, margins faintly flushed cerise; erect, on 8- to 11-inch stalks, above foliage; foliage purplish-brown.

MRS. A. S. GALT (Cobb), **A.M.**—3½ feet. Flowers 3½ inches; bright scarlet; free, erect, on 4- to 9-inch stalks, well above foliage; foliage purplish.

THE BISHOP OF LLANDAFF (Treseder), **A.M.**—3½ feet. Flowers 3½ inches; rich deep scarlet; free, erect, on 6- to 12-inch stalks, well above foliage; foliage purplish.

APOLDRO (Ballego), **A.M.**—3 feet. Flowers 2¾ inches; rich crimson-scarlet; free, erect, on 6- to 10-inch stalks, well above foliage. Near 'Diophen' in colour.

Class VIII. DECORATIVE DAHLIAS.

AWARDS.

R. H. Holton, A.M. September 13, 1928. Raised and sent by Messrs. Stredwick of Silverhill Park, St. Leonards.

Mevrouw E. Ludwig, A.M. September 13, 1928. Raised and sent by Messrs. Ludwig of Hillegom, Holland.

White King, H.C. September 13, 1928. Raised and sent by Messrs. J. G. Ballego.

de Bengel, H.C. September 13, 1928. Raised and sent by Messrs. Topsvoort of Aalsmeer, Holland.

White.

ALFRED DYER (Stredwick).—6½ feet. Flowers 6 inches; white, base pale lemon; free, erect, on 6- to 12-inch stalks, above foliage.

WHITE KING (Ballego), **H.C.**—3½ feet. Flowers 6 inches; at first creamy-white, later white; free, erect, well above foliage.

Apricot.

CAPT. LINDBERGH (Weyers).—4½ feet. Flowers 5 to 6 inches; apricot, inner petals tinged rose; free, erect, on 6- to 12-inch stalks, above foliage.

White and rosy-carmine.

PRESIDENT EMILE DRAPS (Nagels).—6½ feet. Flowers 6 to 7 inches; some white shaded rosy-carmine, others bright crimson-magenta; free, erect, on 12- to 16-inch stalks, at first hidden by the foliage, afterwards above.

Carmine.

DELICATA (Bruidegom).—3½ feet. Flowers 6 to 7 inches; bright rich carmine; margins of petals broadly recurved; free, erect, on 9- to 15-inch stalks, well above foliage.

Pink.

ARTHUR J. COBB (Stredwick).—4 feet. Flowers 6 to 7½ inches; bright rich amaranth-pink; free, erect, on 12- to 14-inch stalks, above foliage.

COLUMBIA (Majoor).—4 feet. Flowers 5 inches; bright tyrian-pink; margins somewhat recurved; free, erect, on 9- to 12-inch stalks, well above foliage.

Lilac.

GRACE CURLING (Stredwick).—5½ feet. Flowers 6 inches; liseran-purple; free, neck weak, on 9- to 14-inch stalks, well above foliage.

IDEAL (Nagels).—4 feet. Stem very stout; foliage very large. Flowers 6 to 7 inches; light phlox-purple; fairly free, erect, on 15- to 20-inch stiff and thick stalks, well above foliage

Orange-scarlet.

LUDWIG THOMA (R. A. van der Schoot).—4 feet. Flowers 6 inches; bright orange-scarlet; free, erect, on 9- to 12-inch stalks, well above foliage.

Scarlet.

R. H. HOLTON (Stredwick), **A.M.**—4½ feet. Flowers 6 to 7 inches; bright scarlet, fades; free, erect, on 9- to 12-inch stalks, well above foliage; margins of petals somewhat recurved.

MISS G. KENKEEL (Majoor).—4 feet. Flowers 6 inches; bright scarlet, inner petals of a darker shade; free, erect, on 12-inch stalks, above foliage, petals flat.

CANBERRA (Stredwick).—6 feet. Flowers 6 to 7 inches; bright scarlet; free, erect, on 6- to 10-inch stalks, at first hidden by the foliage, afterwards just above.

MEVROUW E. LUDWIG (Ludwig), **A.M.**—4 feet. Flowers 6 to 7 inches; deep rich scarlet; free, erect, on 9- to 12-inch stalks, well above foliage; margins of inner petals much recurved.

Purplish-crimson to Purplish-maroon.

DE BENGEL (Topsvoort), **H.C.**—5 feet. Flowers 5 inches; rich purplish-crimson, inner petals channelled, outer flat; free, erect, on 6- to 12-inch stalks above foliage.

RENOWN (Stredwick).—6½ feet. Flowers 5 to 6 inches; rich deep rhodamine-purple shaded maroon, inner petals purplish-maroon, fades; free, erect, on 6- to 10-inch stalks, above foliage.

Class IX. SMALL-FLOWERED DECORATIVE DAHLIAS.

AWARD.

Lowfield Maroon, A.M. September 13, 1928. Raised and sent by Messrs. J. Cheal.

Crimson-maroon.

LOWFIELD MAROON (Cheal), **A.M.**—4½ feet. Flowers 3 to 4 inches; rich crimson-maroon, petals channelled; free, erect on 6- to 10-inch stalks, above foliage.

Class XI. CAMELLIA-FLOWERED DAHLIAS.

Scarlet.

RED ROVER (Cheal).—3½ feet. Flowers 4 to 5 inches; rich crimson-scarlet; free, erect, on 6- to 9-inch stalks, above foliage.

Class XII. POMPON DAHLIAS.

AWARD.

Little Marvel, A.M. September 13, 1928. Raised and sent by Messrs. J. Cheal.

Pink.

LITTLE MARVEL (Cheal), **A.M.**—3 feet. Flowers 2 to 2½ inches; bright mallow-pink; free, erect, on 4- to 9-inch stalks, above foliage. Much paler and of a pinker shade than 'Nerissa.'

Class XIV. STAR DAHLIAS.

AWARDS.

Ethelwulf, A.M. September 13, 1928. Raised and sent by Messrs. Turner of the Royal Nurseries, Slough.

Epsom Star, H.C. September 13, 1928. Raised and sent by Messrs. J. Cheal.

White.

ETHELWULF (Turner), **A.M.**—3¾ feet. Flowers 3 to 3½ inches; white, base lemon; free, erect, on 9- to 13-inch stalks, well above foliage.

Orange-scarlet.

RYE STAR (Cheal).—6½ feet. Flowers 3 to 4 inches; orange, shaded scarlet, tips amaranth-pink; free, erect, on 9- to 16-inch stalks, well above foliage.

EPSOM STAR (Cheal), **H.C.**—Described R.H.S. JOURNAL, vol. **53**, p. 174.

Class XV. CACTUS DAHLIAS.

AWARDS.

Edeghem, A.M. September 13, 1928. Raised and sent by Messrs. Topsvoort.

Stedfast, A.M. September 13, 1928. Raised and sent by Messrs. J. Stredwick.

Reppole, A.M. September 13, 1928. Raised and sent by Messrs. J. Stredwick.

Mrs. Stuart Sandeman, H.C. September 13, 1928. Raised and sent by Messrs. J. Stredwick.

DOUBLE CACTUS.

Yellow.

SAXON (Stredwick).—5½ feet. Flowers 5 to 6 inches; creamy-buff, inner florets picric-yellow shaded pale buff; free, erect, on 12-inch stalks, at first hidden by the foliage, afterwards above.

GOLDEN ROD (Stredwick).—6½ feet. Flowers 5 to 6 inches; bright lemon-yellow; free, erect, on 12- to 15-inch stalks, well above foliage. Show a tendency to come semi-double.

EDEGHEM (Topsvoort), **A.M.**—4½ feet. Flowers 5 inches; broadly quilled; bright martius-yellow; very free, erect, on 8- to 12-inch stalks, well above foliage. A garden Cactus variety.

Yellow and Pink.

DULCET (Stredwick).—7 feet. Flowers 5 to 6 inches; pale orange overlaid with amaranth-pink, base orange; free, erect, on 4- to 12-inch stalks, just above foliage.

Pink.

MRS. FRED WARNER (Stredwick).—6 feet. Flowers 6 inches; pale amaranth-pink, base greenish-white, inner florets pale creamy-white; free, on 6- to 12-inch stalks, at first hidden by the foliage, later above.

MRS. STUART SANDEMAN (Stredwick), **H.C.**—6 feet. Flowers 5 to 6 inches; bright mallow-purple; free, erect, on 9- to 16-inch stalks, well above foliage.

Scarlet.

STEDFAST (Stredwick), **A.M.**—6 feet. Flowers 5 to 6 inches; bright scarlet; free, erect, on 9- to 12-inch stalks, well above foliage.

REDPOLE (Stredwick), **A.M.**—6 feet. Flowers 5 to 6 inches; bright crimson-scarlet; free, erect, on 9- to 12-inch stalks, well above foliage.

SEMI-DOUBLE CACTUS.

Yellow.

DOROTHY BROUSSON (Brousson).—4 feet. Flowers 4 inches; picric-yellow; free, erect, on 6- to 9-inch stalks, above foliage.

ANNUAL LUPINS AT WISLEY, 1928.

FORTY-FIVE stocks of Annual Lupins were sent for trial to Wisley in 1928, as enumerated below. They were all sown on March 20, 1928, ten rows 1½ feet apart of each being sown, and later the seedlings were thinned out to 15 inches apart so that each row contained five plants.

In some cases germination was poor, but generally the plants came up well and grew to cover the ground allotted to them.

They were judged (after being inspected on two or three previous occasions) by the Floral Committee on July 16, 1928, and the awards announced below were then recommended.

Several wild species of Lupinus of annual duration (or behaving as such in gardens) are grown in gardens.

Of these *L. sulphureus* from the mountains of Oregon (one of J. DOUGLAS's finds) and *L. luteus* from S. Europe have yellow flowers. The former is easily distinguished by its densely hairy leaves with thirteen to fifteen leaflets, while the less hairy leaves of *L. luteus* have but seven to ten. *L. luteus* is grown on poor sandy soils as an aid to their fertility, and is extremely common as a green manure on the Continent.

Lupinus affinis from California and *L. pusillus* from the American prairies have blue flowers, but neither was represented in the trial. *L. albus*, a widely-distributed species from S. Europe and Asia, has large white flowers, and like *L. luteus* it is often grown for green manuring. *L. pilosus* from S. Europe has rose-red flowers. It did not occur in the trials, neither did the small-flowered *L. micranthus* from Western America. *L. hirsutus*, a native of S. Europe, varies in colour (but is a self-coloured species), and it was represented by several forms. *L. hirsutissimus* with reddish-purple flowers, and furnished with sticky stinging hairs, is perhaps best avoided: it comes from California.

In the remaining species either the colour of the flowers is not constant, so that the spikes present two or more colours, or the flowers are not self-coloured. The first and final colour of each form grown is noted below.

Two dwarf species of not more than a foot in height are grown, viz. *L. subcarnosus* and *L. nanus*. The former, marked by the white spot in the centre of the deep blue standard and the alternate arrangement of the flowers on the spike, is a native of Texas. *L. nanus* is a very floriferous species with some varieties, like the white tinged lilac (*albus*) and white and rosy-red (*coccineus*): it is a native of California. The other two species commonly grown with flowers of the variable type are best distinguished by the foliage which in *L. Hartwegi* is hairy on both sides and in *L. mutabilis* is rather smooth on the upper surface. *L. Hartwegi*, introduced by the R.H.S. from Mexico many years ago, grows to 2 feet 6 inches or 3 feet in height; *L. mutabilis* from the mountains of S. America is taller, and its flowers have a central yellow mark lacking in *L. Hartwegi*. One variety *Cruckshanksii* is sometimes regarded as a species (*L. Cruckshanksii*), and is distinguished by its large fragrant white flowers with yellow-rose standards becoming violet.

None of the species needs rich soil, and all improve the soil in which they are grown. In the flower garden, especially if the spent spikes are removed, they have a long season of flowering.

AWARDS, DESCRIPTIONS, AND NOTES.

Flowers white.

AWARD.

Hartwegi albus	**A.M.** July 16, 1928.	Sent by Messrs. Daehnfeldt & Jensen of Copenhagen, Denmark.
Hartwegi White		Sent by Messrs. E. Webb of Stourbridge.

NANUS ALBUS (Dobbie, Barr)—16 inches; flower spikes 9 inches; flowers ¼ inch diameter, ½ inch deep, white, faintly tinged pale blue. Flowering from June 16. Messrs. Dobbie's stock contained 80 per cent. blue rogues, while that of Messrs. Barr had 15 per cent. blue rogues.

HARTWEGI ALBUS (Daehnfeldt & Jensen)
HARTWEGI WHITE (Webb) } **A.M.**—2 feet; flower spikes 12 to 15 inches; flowers ¼ inch diameter, ¾ inch deep; white. Flowering from June 30.

HARTWEGI ALBUS (Waller-Franklin, Benary, Barr).—Like the last; stocks contained blue-flowered rogues.

LARGE WHITE (R. Veitch).—2 feet; flower spikes 6 inches; flowers ¾ inch diameter, ⅝ inch deep; white; foliage hairy. Flowering from June 18. Form of *L. hirsutus*.

Flowers yellow.

AWARD.

luteus Romulus, A.M. July 16, 1928. Sent by Messrs. Benary of Erfurt, Germany, and Messrs. Heinemann of Erfurt, Germany.

LUTEUS ROMULUS (Benary, Heinemann), **A.M.**—20 inches; flower spikes 8 to 10 inches; flowers ¼ inch diameter, ½ inch deep; golden-yellow. Flowering from June 30.

MENZIESII (Barr).—32 inches; stem erect branched above; flower spikes 12 to 15 inches; flowers ¼ inch diameter, ¼ inch deep; opening pale yellow becoming tinged red; pods two-seeded. Flowering from July 4.

HYBRIDUS SUPERBUS YELLOW (Webb).—Character as 'L. Menziesii.'

Flowers at first pale rose, later magenta and rose.

AWARD.

tricolor rosa, A.M. July 16, 1928. Sent by Messrs. Sluis & Groot of Enkhuizen, Holland.

TRICOLOR ROSA (Sluis & Groot), **A.M.**—2 feet; flower spikes 12 inches; flowers ¼ inch diameter, ¾ inch deep; at first pale rose, middle white becoming magenta edged rose, wings pale rose-pink. Flowering from June 24.

HYBRIDUS ROSEUS (Benary).—Like the last but contained rogues. Distinct from the variety sent by Messrs. Barr under this name (see below).

Flowers at first pale rose, later rosy-crimson.

AWARD.

Hybridus roseus, A.M. July 16, 1928. Sent by Messrs. Barr of King St., Covent Garden, W.C. 2.

HYBRIDUS ROSEUS (Barr), A.M.—24 to 28 inches; flower spikes 12 to 15 inches; flowers ¾ inch diameter, $\frac{7}{10}$ inch deep; at first pale rose becoming rosy-crimson, wings pale pink deepening to deep rose. Flowering from June 23. Distinct from the variety sent by Messrs. Benary under this name (see above).

ALBUS-COCCINEUS (Daehnfeldt & Jensen, Watkins & Simpson).—Like the last; stocks contained rogues.

HYBRIDUS ATRO-COCCINEUS (Barr).—Like 'Hybridus roseus' of Messrs. Barr. A somewhat uneven stock.

Flowers rosy-buff.

LARGE ROSE (R. Veitch).—2 feet; flower spikes 6 to 8 inches; flowers ¾ inch diameter, ¾ inch deep; rosy-buff. Flowering from June 18. A form of *L. hirsutus.*

Flowers at first magenta, later purple-maroon.

HARTWEGI ROSEUS (Barr, Waller-Franklin) }
HARTWEGI ROSE (Webb) }.—2 feet; flower spikes 12 inches; flowers ¾ inch diameter, ¾ inch deep; at first magenta, middle white, late middle purplish-maroon, wings magenta. Flowering from June 30. Stocks contained blue rogues, that of Messrs. Waller-Franklin was true.

Flowers blue to violet-blue.

AWARDS.

nanus, H.C. July 16, 1928. Sent by Messrs. Daehnfeldt & Jensen, Barr; also as **nanus Blue** by Messrs. Benary, which shares the award.

Hartwegi Dark Blue, H.C. July 16, 1928. Raised and sent by Messrs. Waller & Franklin of Guadalupe, California, U.S.A.

NANUS (Daehnfeldt & Jensen, Barr) }
NANUS BLUE (Benary). } **H.C.**—18 inches; flower spikes 9 inches; flowers ¾ inch diameter, ½ inch deep; azure-blue, middle white later reddish-violet, wings azure-blue. Flowering from June 14. Sent by Messrs. Dobbie as 'nanus' failed to germinate.

NANUS SELECTED (Hurst).—Like the last.

SUB-CARNOSUS (Barr, Sluis & Groot, Dobbie).—10 inches; flower spikes 5 inches; flowers ⅝ inch diameter, and deep; azure-blue, middle blotched pale cream, wings azure-blue. Flowering from July 2.

HARTWEGI COELESTINUS (Daehnfeldt & Jensen, Barr, Watkins & Simpson).—2 feet; flower spikes 12 inches; flowers $\frac{8}{10}$ inch diam. $\frac{7}{10}$ inch deep; pale greyish-blue, middle white, wings pale sky-blue. Flowering from June 30. Stocks contained white and pink rogues.

HARTWEGI SKY BLUE (Waller-Franklin, Webb).—Like 'Hartwegi coelestinus.'

HARTWEGI DARK BLUE (Waller-Franklin), **H.C.**—24 to 28 feet; flower spikes 12 to 15 inches; flowers ⅞ inch diameter, ¾ inch deep; azure-blue, middle of standards tinged violet with age. Flowering from June 30.

HARTWEGI DARK BLUE (Webb).—Like the last but contained white and rose rogues.

HARTWEGI BLUE (Benary).—Like 'Hartwegi Dark Blue.' Contained white rogues and varied in shade.

LARGE BLUE (R. Veitch).—2 feet; foliage very hairy, grey-green; flower spikes 9 inches; flowers ¾ inch diameter, ¾ inch deep; azure-blue middle white becoming reddish-violet with age, wings azure-blue. Flowering from June 18. A form of *L. hirsutus.*

VENUSTUS (Sluis & Groot).—2 feet; foliage dark green; flower spikes 6 to 9 inches; flowers ¾ inch diameter, ½ inch deep; violet-blue, middle violet. Flowering from June 23.

Flowers at first white tinged blue, later violet to maroon.

AWARD.

mutabilis, H.C. July 16, 1928. Sent by Messrs. Barr.

MUTABILIS (Barr), **H.C.**—3 feet; flower spikes 12 to 18 inches; flowers ¾ inch diameter, ⅞ inch deep; white tinged rosy-lavender middle blotched yellow, this becomes smoky-violet with age, wings at first white later smoky-violet. Flowering from June 28.

MUTABILIS var. CRUCKSHANKSII (Barr).—Character as 'mutabilis' but flowers at first white margins tinged azure-blue with a middle yellow blotch; this becomes violet-blue with age, wings azure-blue.

Flowers at first white, later violet-maroon.

AWARD.

Hartwegi superbus, H.C. July 16, 1928. Sent by Messrs. Watkins & Simpson of Drury Lane, Covent Garden, W.C.

HARTWEGI SUPERBUS (Watkins & Simpson), **H.C.**—30 inches; flower spikes 9 to 12 inches; flowers ¾ inch diameter, ⅝ inch deep; opening white middle cream, becoming rosy-magenta deepening to violet-maroon, wings opening white, becoming pale rose. Flowering from July 6.

DUNNETTII SUPERBUS (Barr).—2 feet; flower spikes 9 inches; flowers ¾ inch diameter, ½ inch deep; opening white to rosy-magenta, deepening to violet-maroon, wings at first white, later rosy-magenta. Flowering from June 30.

Flowers mixed.

HARTWEGI MIXED (Daehnfeldt & Jensen).—

TALL ANNUAL (Spruijt).—

SALVIAS FOR BEDDING TRIED AT WISLEY, 1928.

SIXTY-SEVEN stocks of Salvias for bedding out were grown at Wisley under trial in 1928.

The seed was sown under glass on March 8, 1928. The seedlings as soon as ready were pricked out into sixty's and later potted into 5 inch pots. They were planted on June 19, on well prepared soil in rows 2 feet apart, and 18 inches apart in the rows, the rows being staggered, and of each stock 28 plants were grown.

Growth was good on the whole and the summer suited the varieties of *Salvia splendens*, though *S. patens* would probably have been better in a wetter year (which would have been less suitable [like 1927] for the varieties of *S. splendens*).

Even in these favourable circumstances, however, several varieties of *S. splendens* were too late to flower before the killing frost of October, and for this method of cultivation they must be regarded as unsuitable for our climate. The varieties which failed to flower were: 'Pride of Kent' (from Mr. Brown), 'Glory' (from Messrs. Barr), 'Glory of Stuttgart,' 'Principe di Napoli,' 'Lord Fauntleroy,' 'cupreata,' 'nana bicolor,' 'aucubaefolia,' 'aucubaefolia violacea,' and 'Parma Violet' all from M. Herb. These varieties are not further referred to.

The trial was inspected at intervals during growth and finally on August 15, 1928, when the Committee made recommendations for awards as shown below.

AWARDS, DESCRIPTIONS AND NOTES.

Flowers creamy-white.

SPLENDENS ALBA (Herb).—2 feet. Flower spikes 3 inches long; flowers ½ inch diameter, creamy-white. Flowering from October 3. Germination poor.

ALBA (Herb).—
WHITE PEARL (Barr).— Like 'splendens alba.'
PERLE BLANCHE (Rivoire).—

Flowers pale pink.

SPLENDENS CARNEA (Herb).—20 to 24 inches. Flower spikes 4 inches long; flowers ½ inch diameter, pale pink, fades. Flowering from September 2.

CARNEA (Herb).—Like the last.

* * *

AUCUBAEFOLIA CARNEA (Herb).—Like 'splendens carnea' except that the foliage is of medium green spotted with pale yellow. Rogues of 'Splendens carnea.'

Flowers salmon.

PERLE ROSE (Rivoire, Barr).—10 inches; plant compact. Flower spikes 4 inches long; flowers ½ inch diameter, 1½ inch long, pale salmon, fades very much. Flowering from August 31.

SALMON-PINK BEDDER (Burpee).—Like 'Perle Rose.' Germination poor.

DWARF SALMON BEAUTY (Johnson).—Like 'Perle Rose.'

* * *

SALMONEA (Herb).—2 feet. Flower spikes 4 to 5 inches long; flowers ½ inch diameter, 1½ inch long, salmon, fades. Flowering from August 31. Contained scarlet rogues.

Flowers rose.

BOUQUET ROSE (Rivoire).—18 inches. Flower spikes 4 to 6 inches long; flowers ½ inch diameter, 1⅜ inch long, dull rose. Flowering from August 14.

* * *

ROSEA (Herb).—18 to 24 inches. Flower spikes 4 to 6 inches long; flowers 5/16 inch diameter, 1½ inch long, dull rose-carmine. Flowering from August 24. A very variable stock in height and colour; scarlet and violet rogues.

Flowers scarlet.

AWARDS.

Early Dwarf Bedder, A.M. August 15, 1928. Raised and sent by Messrs. Sluis & Groot of Enkhuizen, Holland.

Harbinger, A.M. August 15, 1928. Introduced by Messrs. Watkins & Simpson and sent by Messrs. R. Veitch of Exeter. Also sent by Messrs. Watkins & Simpson of Drury Lane, Covent Garden, W.C., and Messrs. Pearson of Lowdham, Notts, and as 'Harbinger Improved' by Messrs. Watkins & Simpson, these were **Highly Commended.**

Fireball, A.M. August 15, 1928. Sent by Messrs. R. Morris of Birmingham. Also sent by Messrs. Heinemann of Erfurt, Germany, whose stock was **Highly Commended.**

EARLY DWARF BEDDER (Sluis & Groot), **A.M.**—Plant 10 to 12 inches, very compact, dark green; flower spikes 6 to 8 inches long; flowers ½ inch diameter, 1½ inch long, bright rich scarlet. Flowering from July 16. A very good, true and even stock.

* * *

HARBINGER (R. Veitch), **A.M.**—Plant 12 to 15 inches, very compact, dark green; flower spikes 6 to 8 inches long which are held erect; flowers ½ inch diameter, 1⅜ inch long, bright rich scarlet. Flowering from July 16. A good, true, and even stock.

HARBINGER (Watkins & Simpson, Pearson)
HARBINGER IMPROVED (Watkins & Simpson) } **H.C.**—Less even stocks of the last.

HARBINGER (W. H. Simpson, Barr).—Irregular stocks.

* * *

FIREBALL (Morris), **A.M.**—Very much like 'Harbinger' but of somewhat more compact habit, the flower spikes being less erect but more compact and the flowers of a darker and brighter shade. Flowering from July 16. A very good, true and even stock.

FIREBALL (Heinemann), **H.C.**—A less regular stock of the last. Germination poor.

FIREBALL (Cooper, Taber, R. Veitch, Benary, Barr).—Irregular stocks, the last very mixed.

* * *

FIRE DRAGON (Hurst).—Dwarfer (9 inches) and of more spreading habit, with looser flower spikes and paler flowers than 'Fireball.' Flowering from July 16. Sent as plants.

* * *

DWARF SCARLET (Bunting).—An irregular stock; much resembling 'Fireball' but later to flower. Flowering from August 8.

* * *

SPLENDENS LILIPUTANA (Herb).—12 to 14 inches. Flower spikes 4 to 5 inches long; flowers bright rich scarlet, not a free flowerer. Flowering from August 24.

* * *

MINIATUR (Herb).—Much like 'splendens Liliputana' but later to flower. Flowering from September 2. Black rogues.

* * *

VESUVIUS (Herb, Barr).—Taller, 14 inches, and later to flower than 'splendens Liliputana.' Flowering from September 12. True stocks. Germination of the first poor.

* * *

BIZARRE (Herb).—13 to 18 inches; flower spikes 3 to 7 inches long; flowers bright rich scarlet. Flowering from August 24.

JEWEL (Herb).—An irregular stock both in height and length of flower spike; not free flowering. Flowering from August 24.

* * *

PRIDE OF ZURICH (Barr, Herb).—15 to 18 inches; flower spikes 4 to 5 inches long; flowers scarlet, free flowering. Flowering from August 20. Irregular stocks.

* * *

BONFIRE (Cooper, Taber, Herb, Barr).—2 feet. Flower spikes 4 inches long; flowers bright rich scarlet, not very free flowering. Flowering from September 2. Stocks not true.

* * *

INGENIEUR CLAVENARD (Herb).—A mixed stock.

* * *

SCARLET GLOW (Herb).—A very mixed stock.

* * *

SANGUINEA (Herb).—Mixed.

* * *

ROEMERIANA (Herb).—Plant 6 inches, very compact; flower spikes 6 inches long; flowers ¼ inch diameter, ¾ inch long, dark scarlet, calyx reddish. Flowering from July 10.

* * *

COCCINEA GRANDIFLORA (Herb).—Plant 2 to 2½ feet, spreading; foliage dark greyish-green; flower spikes 12 to 15 inches long; flowers ⅓ inch diameter, 1 inch long, scarlet; calyx dark brownish-green. Flowering from July 12.

Flowers lavender-blue.

AWARD.

Farinacea, H.C. August 15, 1928. Sent by Messrs. Benary of Erfurt, Germany.

FARINACEA (Benary), **H.C.**—Plant 2¾ to 3¼ feet tall, erect; stems tomentose; flower spikes 12 to 18 inches; flowers ⅜ inch diameter, ½ inch long, lavender-blue; calyx hairy, greyish-blue. Flowering from July 27.

FARINACEA (Herb).—An irregular stock of the last. Contained the white-flowered form.

Flowers rosy-lavender, bracts violet-blue.

HORMINUM (Kent & Brydon).—Plant 18 inches tall; foliage dark sage-green flower stems 9 to 12 inches long; flowers ⅛ inch diameter, 3/10 inch long, rosy lavender; bracts violet-blue. Flowering from September 3.

Flowers gentian-blue.

AWARD.

Patens, A.M. August 15, 1928. Sent by Messrs. R. Veitch.

PATENS (R. Veitch), **A.M.**—Plant 15 to 18 inches tall, spreading; foliage dark greyish-green; flower stems 12 inches long; flowers ¼ inch diameter, 1½ inch long, bright rich gentian-blue. Flowering from July 16.

Flowers violet-purple.

SPLENDENS VIOLACEA (Herb).—2 feet. Flower spikes 4 inches long; flowers violet-purple. Flowering from September 2. Contained pink rogues.

* * *

PURPUREA (Herb).—A very mixed stock.

BOOK REVIEWS.

" A History of Garden Art." By Marie Louise Gothein. Ed. by W. P. Wright. Trans. by Mrs. Laura Archer-Hind, M.A. la. 8vo. 2 vols. 459 + 486 pp. (Dent, London, 1928). 84*s*. net.

It is quite impossible in a short review to do justice to, or touch on, the many hundreds of gardens so admirably described and illustrated in this wonderfully comprehensive and entertaining book, which will surely appeal to every garden lover. As the editor says in the Preface, it will not only easily take its place as a garden classic, but might quite well rank as an historical and social classic also.

It is admirably translated by Mrs. Archer-Hind, and the 660 illustrations are a liberal education in gardening, by studying which one can readily observe the developments of gardens throughout the ages and note how one country has borrowed ideas from another. Our pergolas, loggias, water-lily tanks are, of course, copied from Italy, and even roof-gardens are not new, for fig. 150 shows a very pretty one at Verona. However, England has invented crazy paving and the bird-bath, and no other country seems to have copied them as yet !

Beginning with ancient Egypt and Western Asia the authoress leads the reader through Greek, Roman, and Byzantine gardens of Islam and of the Middle Ages, the Renaissance gardens of Italy, Spain, France, and England, even going so far as China, Japan, and America.

Apparently to one Humbaba, a Babylonian, belongs the credit of having originated the first park or garden " where the Cedar abundant and tall covers the Thorn bush and the dark hued sloe and beneath the cedar the sweet smelling plants." The authoress is rather sparing with her dates, but Humbaba seems to have lived some 2,500 years before Christ. Much later Sennacherib, who was evidently a keen horticulturist, describes his garden at Assur as " containing Myrrh, vines and fruits from every country, spices and Sirdu trees " ; he also caused extensive canals and water-courses to be made for his palms and cypresses. Traces of these canals and ponds have been found, showing the large area of 16,000 sq. metres.

In the twelfth century King Parakama made a wonderful park and garden in Ceylon, where " Jessamine climbed about the trees and fruit trees (some brought from abroad) and flowers to delight the eye and ponds with lotus and lilies."

The authoress tells how the Greeks were filled with sheer amazement when they saw the magnificent parks of Eastern potentates, but all the same they appear to have taken little interest in gardens, though flowers were largely used at their festivals.

When we come to the Roman period many of the villa gardens are described, and some of the plans and designs of Pompeian gardens are delightful.

Passing to Byzantine times the well-known gardens of the Linderaja and Generalife at Granada, the Tshehar-Bagh in Persia, and the Shah's garden at Ashraf are described and illustrated.

Then come the gardens of the Middle Ages and the Italian Renaissance, which are extremely beautiful and will probably attract the reader more than any in the book. The wonderfully beautiful Villa d'Este at Tivoli, the gardens of the Vatican and the Villa Torlonia, the Villa Medici and the Villa Borghese, all at Rome, the Villa Lante at Viterbo and the Boboli Gardens at Florence—these, and countless others equally beautiful, are described and illustrated; and it is surprising that the present-day Italians, surrounded as they are by so many of these historic and beautiful villas, should care so little about them and that so many should be neglected and for the most part unsuitably planted, and that even such enchanting gardens as those on Lake Maggiore—the Isola Bella and Isola Madre—should be so badly kept up.

Amongst the Spanish and Portuguese gardens, those of Philip II at Aranjuez near Madrid and that of Charles V at El Pardo may be noticed, and there is a charming picture of the Marques de Fronteira's garden at Benefica, near Alcantara in Portugal.

One notices next the sumptuousness of the French and English gardens at the time of the Renaissance. Amongst the English, those at Hampton Court, Theobald's (which James I persuaded Lord Salisbury to exchange for Hatfield, then the property of the King), Nonsuch, Haddon, Wilton, and others are described by the authoress in a delightful and historical style.

Volume II begins with a description principally of German, Austrian, and Dutch gardens, all in the French manner, very magnificent, but all bearing a close resemblance to one another. A most interesting chapter is devoted to the spacious days of Louis XIV and Le Notre's great masterpieces—Versailles, Vaux le Vicomte, Fontainebleau, and St. Cloud. There is no doubt that Le Notre had greater influence on the style of European gardens than anyone else, and in the seventeenth century the formal gardens of France were copied in every country, including England, though on much more subdued lines.

Fouquet, the Finance Minister of Mazarin, started the ball rolling when he built Vaux le Vicomte, near Melun. It was then that André Le Notre, who had studied painting in Italy and had been captivated by the beauty of the Italian gardens, was recommended to Fouquet by Le Brun, the artist, who was engaged in decorating the château. It was not till 1661 that the gardens were sufficiently advanced for Fouquet to give the great fête in honour of Henrietta, wife of the Duke of Orleans, which was to bring about his downfall. Fouquet appears to have had unlimited money, and the magnificence of his palace and gardens had excited the envy of Louis XIV, who determined to be rid of him. It was then that the King engaged Le Notre to lay out the grounds for the new palace of Versailles. There are many illustrations of these wonderful gardens, as well as those of Vaux le Vicomte, where at one time Fouquet is said to have employed 18,000 workmen.

One cannot help admiring the genius of Le Notre and the grandeur of his ideas, but at the same time one wonders what pleasure anyone can have drawn from the possession of those gigantic and, for the most part, treeless parterres.

Fortunately, this style of gardening never caught on in England to any great extent, though there are, or were, examples at Hampton Court, Badminton, Bramham, Chatsworth, and Trentham, but none at all comparable with Fouquet's marvellous garden at Vaux le Vicomte. For stately homes like the above the grand French style may be appropriate, and even now M. Duchesne, the twentieth-century Le Notre, is laying out a wonderful terrace-garden for the Duke of Marlborough at Blenheim.

We agree, however, with Addison, who in 1712 wrote: "I cannot but fancy that an orchard in flower looks infinitely more delightful than all the little labarynths of the most finished Parterre."

The chapter on "Modern English Gardening," by W. P. Wright, is very disappointing, and none of the gardens illustrated can be regarded as in any way representative of the best English ones. They look very poor after the sumptuous gardens depicted in the previous pages. Fig. 639, for instance, showing "rockwork judiciously placed," is distinctly bad, as of course "rockwork" should never be in close proximity to the house. Abbotswood, which can have no pretensions to appear in a "History of Garden Art," is made to appear worse than it is by the top of the picture being cut off. On the whole, this chapter might have been omitted, as might also the last one on "Landscape Architecture in North America," about which little need be said.

The only other criticism one can make is that the paper is hardly worthy of the book, and it is a pity a hand-made paper should not have been used.

Nevertheless, this is a book of great beauty and distinction, and as every kind of garden is dealt with, it should be of the greatest possible use to anyone making a garden.

"The Hardy Heaths and some of their Nearer Allies." By A. T. Johnson. 8vo. 116 pp. (Gardeners' Chronicle Ltd., London, 1928.) 3*s*. 6*d*.

The author of this admirable little book lives in a land of Heather, and knows and describes the many kinds exceedingly well.

His remarks on Habits and Distribution, Soil and Situation, Propagation, etc., are all sound and to the point, and should be of the greatest assistance to all who contemplate making a Heather Garden. This kind of garden is becoming increasingly popular and deservedly so, as when once planted it is easily and economically kept up; there is no staking and tying to do, and if the ground is well cleaned before planting the close-growing Heaths will keep down all weeds.

They will stand drought, rain and wind with impunity and are rarely injured by frost, and although the author says they are better for being clipped after blooming they will thrive equally well if left severely alone.

His advice to plant annuals amongst newly planted Heaths is open to criticism, and it is surely better to use the hoe to keep down weeds than to rely on annuals to conserve moisture.

It is questionable whether Heaths are suitable in a Rock Garden, and although logically there can be no reason why they should not be included in a mixed border, few will agree that they are suitable either there or in beds in grass or used for carpeting. Heaths are better planted in large groups in the Heath Garden which, if possible, should extend right up to its background of trees or whatever it may be.

The allied shrubs recommended for the Heath Garden are well chosen but care would have to be taken that dwarf shrubs like *Bruckenthalia spiculifolia*, *Leiophyllum buxifolium*, and the difficult *Cassiope tetragona* are not overrun by stronger growing Heaths. Mr. Johnson rightly insists on the importance of *Daboecia* (*Menziesia*) *polifolia* in the Heath Garden. This should be largely planted in the three colours, red, purple, and white, as it blooms from June to the end of October.

It is hoped that Mr. Johnson's useful, practical, and well-illustrated book will dispel the idea that Heaths are difficult to grow and that lime is fatal to all of them; some kinds such as *carnea*, *mediterranea* and *darleyensis* flourish in its presence.

"The Perfect Garden: How to keep it beautiful and fruitful." By W. P. Wright. 2nd Edn. xi + 408 pp. (Richards Press, London, 1928.) 7*s*. 6*d*. net.

Published in 1908 and reprinted twice, we have now a second edition of a book that has proved of value to many an amateur. The book is in five parts: Part I deals with "the outlook"—it is intended to create a point of view; Part II with the flower garden; Part III with plant and fruit houses; Part IV with the fruit garden; Part V with the vegetable garden. Lastly, there are 40 pages of plans, with notes for planting. It is thus a complete book compared with many; it contains much wise advice, many illustrations, and adequate lists for the beginner.

"Allotment Gardening." By W. Good. 8vo. xvi + 397 pp. (Gresham Publishing Co., London, 1922.) 21*s*.

This is a compendious account of plants one may grow in the small garden even when provided with a greenhouse, and therefore includes much more than one would expect to find in a book with the title used. Even the window-box and the plants to grow in it is not omitted, and chapters deal also with growing vegetables for exhibition, and with the insects, birds, and fungi apt to inhabit our gardens. Nothing seems to be forgotten. The book is well printed on thick paper, well illustrated, but rather heavy to hold.

"Black's Gardening Dictionary." Edited by E. I. Ellis. 2nd Edn. 8vo. 1238 pp. (A. and C. Black, London, 1928.) 7*s*. 6*d*.

A second edition, the first having been published in 1921. No very great changes have been made, and the book remains a very useful one on popular lines for the amateur gardener. The various articles have been written by eminent specialists, and their names constitute a formidable list.

"The Cultivation of Citrus Fruits." By H. Harold Hume. 8vo. 561 pp. (Macmillan, London, 1926.) 21*s*. net."

In the introduction to this volume the author explains that it has been prepared to replace "Citrus Fruits and their Culture," published in 1904, which is now out of print and also very much out of date in many particulars. With the remarkable advance made in the cultivation of Citrus fruits in America in the intervening years—at the present time, we learn, by far the greater proportion of the product consumed in the country is grown at home—there have been many changes in cultural practices. These changes and the modern methods of growing and handling the fruits are set out in this new book, and the grower of Citrus fruits has now more useful knowledge at his disposal than ever before.

The lines along which the Citrus-growing industry of America has developed, to become the highly specialized and "standardized" concern it now is, are explained in some detail in early pages of the book, and it seems evident that the establishment of co-operative marketing agencies, and the investigations conducted under the direction of the United States Department of Agriculture into growing, harvesting, and market methods, are factors largely responsible for the continued success of the industry.

The methods of cultivation, irrigation, manuring, marketing, etc., most likely to be suitable in different States and districts are fully dealt with, and in the chapters on "Botany of Citrus Fruits" and "Citrus Diseases," among others, the student will find much valuable material for study and reference.

There are no fewer than 237 figure and plate illustrations, and the excellence of these, with the clear type and complete index, maintain the high standard set by the Rural Science Series, edited by L. H. Bailey, to which this volume is an addition.

"The Joy of the Ground." By Marion Cran. xi + 320 pp. 8vo. (Jenkins, London, 1928.) 10*s.* 6*d.* net.

Mrs. Cran has the happy knack of talking with her pen, and it has not failed her in this instance, where she has collected some chapters which have appeared in various publications and added others. A good deal of horticultural information is conveyed along with pleasant talk of people and things, and we put down the book with new ideas and ways of looking at things. Do not buy this book expecting a dictionary of gardening, or a cut-and-dried " how to do it " book; rather buy it for its homely intimacy, and the way it shows its author's outlook to the garden.

" Evergreens for the Small Place." By F. J. Rockwell. xi + 84 pp. 8vo. (Macmillan, New York, 1928.) 4*s.* 6*d.*

We have noticed several of the books written by this author, and have found cause to criticize some things in them all. Our author is at least consistent. Here " Evergreens " means " Conifers."

" How to Enjoy Garden Flowers." By Marcus Woodward. 252 pp. 8vo. (Hodder & Stoughton, London, 1928.)

Much of the true value of a garden and of its inhabitants lies in its associations and the sentiment attached to it and them. So the author of this book believes. He has brought together lore and legend of many a common garden flower and woven them in charming prose and culled, too, many a poet's fancy in the poet's words to colour the pattern he has made. It is a book to take now and then when our thoughts may be led away from present urgencies, to dwell a little in the calm of the past and think a little on the ideas of our forefathers—those of them who were single-minded enough to enjoy simple country things.

"The Biology of Insects." By George H. Carpenter. xv + 473 pp. 88 figures, 16 plates. (Sidgwick & Jackson, London, 1928.) 16*s.* net.

This volume is the fifth of a series of manuals on the biology of animals and plants, under the general editorship of Professor J. Arthur Thomson.

The species of insects so far outnumber those of other animal groups that it is highly creditable to an author who can compress such a vast amount of available material into the space of one volume. The question of morphology is somewhat cramped, but this has been necessary to allow for other aspects of the subject.

There are sixteen chapters, which deal with feeding, respiration, movement, behaviour, reproduction and heredity, and growth and transformation.

Family and social life are discussed in the space of two chapters, whilst other chapters deal with classification, evolution, and the relation of insects to other organisms.

Finally, the author deals with the relationship of insects to man. It is somewhat surprising to find that the work which has been carried out during recent years on the biological control of weeds, principally in Australia and New Zealand, is omitted.

The discussion on Tropisms is confined, unfortunately, to the phototropic responses of insects (pp. 92–100). There are many other tropisms, knowledge of which plays a large part in the applied entomologist's campaign against injurious species.

The photographic reproductions of insects are excellent. The book is well equipped with figures obtained from various publications and due acknowledgement is made to the authors.

In the paragraph which deals with bark beetles (p. 384), there is no mention of the conditions under which an attack by this group of insects is encouraged. The factors which inhibit infection are vigour, healthy root system and freedom of the host from damaged tissues and pathogenic organisms.

The list of references at the end of the book is necessarily limited, but to our mind it would have been preferable to place the several authors' papers under chapter headings.

We may confidently recommend this book to all Nature lovers. The story of the life, and all that it implies, of the small but most important members of the animal kingdom which are continually challenging man for the domination of the world is told with clarity and charm by a master. The perusal of the work by entomologists, whether they deal with physiological or applied problems, will result in a greater understanding.

" Leaf-Mining Insects." By J. G. Needham, S. W. Frost and Beatrice H. Tothill. viii + 351 pp. 91 figures, 3 plates. (Ballière, Tindall & Cox, London, 1928.) 27*s.* net.

The object of this textbook is, according to the senior author, threefold—firstly to provide an untechnical introduction to the study of leaf-mining insects; secondly, to present an account of their natural history sufficiently detailed to be useful to the working ecologist and, lastly, to give lists of the leaf-mining species, of their food plants and of technical papers concerning them adequate to the needs of the specialist.

The observations of various workers in this field have been brought together and made available for the general reader who otherwise would spend a considerable time perusing the scattered results of investigators. Such an undertaking has entailed a great amount of patient work, whilst the name of Professor Needham, who acted as general editor, is sufficient warrant for the purchaser.

We cannot agree, however, with the decision of the senior author to omit the describer of the species after each scientific name. The nomenclature of these insects, especially amongst the Diptera, is in such a state of flux that the addition of an author's name appears indispensable.

There are sixteen chapters which may be grouped into three main sections. The first deals with the study of leaf-mining insects. The second is devoted to a detailed account of the life history and habitats, together with descriptions of the various life stages, of the more important species arranged under Orders, Sub-Orders and Superfamilies. The third section consists of lists of leaf-mining insects and their host plants and a comprehensive bibliography

The Lepidoptera, an Order in which the leaf-mining habit is strongly developed, occupies nine chapters. The Coleoptera, Diptera and Hymenoptera have each a chapter devoted to them.

Useful keys are given by which the larvae of the various Orders and Families may be identified.

The book is primarily intended for North American students, as the authors have excluded all European species with the exception of those which occur in North America.

The reason for the remark that species of *Cricotopus* are not true leaf-miners (p. 241) is not clear, for at least one species has been recorded from North America by Pettit and others as mining the leaves of Nymphaeas.

The question of control measures against this group of insects is dismissed in eight lines (p. 38). When it is considered that many of them are capable of committing a great amount of damage to such plants as beetroot, mangold, celery, chrysanthemum, cineraria and lilac, it was hoped that a somewhat extensive survey of the repressive work carried out by various workers would find a place.

Forty-five pages are given over to lists of leaf-mining insects and their host plants and, as each is numbered, cross-references are available.

The bibliography is fairly complete, but there are some outstanding omissions of the work of European authors.

" Spraying, Dusting and Fumigating." By A. F. Mason. xxxi + 539 pp. 237 figures. (The Macmillan Co., New York, 1928.) 21*s.* net.

This handbook is the latest addition to the library of the Rural Manuals, under the editorship of Professor L. H. Bailey.

The author's note in the preface explains the object of the book which is " to supply in a condensed form for the use of the commercial, professional and amateur fruit-grower and gardener the latest information on the methods, machinery and principles involved in combating agricultural pests."

It is clear throughout the work that the author is thoroughly acquainted with all the aspects of the subject, and the various sections are dealt with in a manner which is clear to even the most conservative-minded grower, and is therefore laudable.

There are thirty-eight chapters, of which eight are devoted to a discussion of the principles underlying spray practices, spraying materials (both insecticides and fungicides) and selection of and qualifications for spraying machinery.

Chapter IX should receive the careful consideration of all who practise the art of spraying. Such important questions as timeliness, thoroughness, equipment and accessories, methods of approach to the tree and methods of utilising equipment and labour are of vital interest to the small but important section of the community who live by wresting the fruits of the earth from the ravages of countless swarms of insect pests and from the havoc wrought by parasitic fungi.

There are chapters which deal with dusts and dusting, fumigation and soil sterilization, all of which are written in the concise and readable manner which pervades the book.

Chapter XIII is devoted to a discussion on the necessity of correctly diagnosing troubles other than those caused by insects and fungi.

Keys to the symptoms by which attack by microarthropodal, arthropodal, fungal and bacterial organisms, together with notes on the respective causative agents, and spray schedules are given under chapter headings and deal with fruit, vegetable, pulse, cotton, and tobacco pests.

The penultimate chapter is confined to a review of seed-borne diseases of farm and vegetable crops. The materials and methods for use against this class of disease are referred to in detail.

The last chapter provides, firstly, information for the amateur gardener under the heading of " The Control of Pests in the Dooryard Garden," and, secondly, a Spray Dilution Table.

Notes on the use of the Spray Gun (pp. 146–152) for attachment to high-powered spraying machines are worthy of careful consideration by home growers of standard fruit, for it is an implement which should receive greater attention in this country because of the ease by which tall trees are sprayed, the speed of delivery and its comparative lightness.

The numerous illustrations are excellent and the book is liberally furnished with them, whilst the general arrangement of the book is deserving of the highest praise.

Although a great deal of the information contained in the handbook is primarily for American readers, yet the subject-matter is so comprehensive that it can be faithfully recommended for fruit farmers and market gardeners the world over. This volume should certainly be kept as a reference work by applied entomologists and mycologists who, to-day, must be *au fait* with questions of spraying and dusting machinery, types of nozzles, formulae for insecticides and fungicides and the symptoms of attack due to insects and fungi.

" 500 Gardening Hints by 500 Gardeners." 8vo. xi + 160 pp. (Country Life, London, 1928.) Paper 1*s.* 6*d.* Boards 2*s.*

Short paragraphs reprinted from papers sent out by the publishers from a great diversity of pens giving hints mainly from personal experience on a great number of gardening subjects, constitute this book. Many of them are open to criticism of course but as the preface suggests, if you know of better ways tell us of them !

Most of us can learn something from them, especially if we are old enough to know how much there is to learn, and the excellent Index will enable us to find what we want without delay and the clear print to read it without fatigue.

"The Amateur's Greenhouse." By T. W. Sanders. Ed. 7. 442 pp. 8vo. (Collingridge, London, 1928.) 7*s.* 6*d.*

Previous editions of this " Complete Guide to the Construction, Heating, and Management of Greenhouses and the Cultivation of Greenhouse Plants " have been reviewed in this Journal, and the praise there given continues to be merited. That it supplies a want is evident, too, from the fact that a further edition has been called for. Propagation, potting, and the treatment of unusual groups of plants are dealt with fully, as well as the cultivation of all the common greenhouse plants.

"The Care of Ornamental Trees in Planting, Fertilizing, Pruning, Tree Surgery and Spraying." By C. I. Greeves Carpenter. xvi + 70 pp. 8vo. (Macmillan, New York, 1928.) 5*s.* 6*d.* net.

Probably more attention is paid to trees in American cities than is generally the case in England, for " forestry " was one of the things taken up by the people there most vociferously a few years ago, just as prohibition was more recently, and with like success. The care of trees in streets and " town lots " is not of course forestry, but a great impetus was given to arboriculture, and many American cities have benefited and many men are to be found in America competent to deal with the problems such trees and their treatment present. The present book is excellent in the clear advice it gives and is worthy of praise in everything except its high price. Many landscapes in England owe much to their woodland scenes and tree masses, but few places owe so much of this amenity to trees as do, for instance, Geneva, New York, or Hamilton, Ontario. The plantings that have been made in these cities are worthy examples for others to follow.

"The Evolution and Classification of Soils." By the late Dr. E. Ramann and C. L. Whittles. xii + 128 pp. 8vo. (Heffer, Cambridge, 1928.) 7*s*. 6*d*. net.

The original publication of this book in German occurred in 1917 and this translation will be welcomed. There are many good books on soil types and formation but the present, within its comparatively small size, covers a wider field than most of them in a more general way, *i.e.*, without the mass of detail, which, valuable as it is, sometimes tends to cloud the wider outlook. The author's writing was lucid and direct, and the translator is to be congratulated on retaining these desirable characteristics and on giving us a book remarkably clear of German idiom while still an accurate translation. We can recommend the book most heartily to all students of the soil.

"A British Garden Flora." By Lt.-Col. J. W. C. Kirk. 8vo. 584 pp. (Edward Arnold & Co., London, 1927.) 42*s*. net.

This is one of the most important manuals dealing with the botanical side of garden plants.

Its key and numerous beautifully-drawn illustrations will, no doubt, cause many to prefer it to the well-known and used Willis's "Flowering Plants and Ferns."

However, to construct an infallible key on so vast a scale is almost beyond the ingenuity of the most omniscient botanist.

The one under consideration appears to fail in the case of the lanceolate-leaved species of Ranunculus—such as *amplexicaulis*, *pyrenaeus*, *gramineus*, *Lingua* and *Flammula*, but should prove as easy to work with as any in existence. An astonishing amount of information has been compressed into the short accounts of the genera dealt with, and no one can use the book without learning interesting facts, historical and etymological, as well as botanical.

Errata are singularly few for a book of such wide scope. *Anemone apennina* has suffered from the frequent fault of an extra "p." *A. sylvestris* is said to possess a corm instead of its own fibrous root system. *Arundinaria nitida* should not be accredited with "large leaves." Two species of Crocus occur in North Africa. *Crocosmia* and *Ephedra* are omitted. *Dierama* is a neuter in "a." So *pendulum* is the correct form for the specific name.

Is *Anemone acanthifolia* in cultivation ? The illustration and description suggest *A. rivularis.*

These are, however, minor blemishes that, like a mole on a beautiful woman's cheek, only enhance the surrounding perfections.

"Practical Botany for Matriculation." By G. M. Shuttleworth. 8vo. 266 pp. (University Press, London, 1928.) 5*s*.

This elementary text has been written for students reading for the matriculation examination. As the subject-matter is often set out in a summarized, and almost tabular form, the student can become acquainted with the salient features of the chapter with the minimum of reading. Whilst this method may aid him to "satisfy the examiners" it scarcely forms an ideal introduction to the study of plants, nor is it likely to stimulate an artistic appreciation of their beauty.

In the chapters dealing with the structure and function of the different parts of the plant body particular attention has been paid to the flower and the process of pollination. The diagrams accompanying the descriptions of fertilization are not so clear as many others scattered throughout the text. Practical instructions are to be found either at the beginning or end of a chapter.

"Elements of Botany." By Richard W. Holman and Wilfred W. Robbins. 8vo. 359 pp. (John Wiley & Sons, New York.) 17*s*. 6*d*.

The authors published a "General Text Book of Botany for Colleges and Universities" in 1924. This volume forms an abridged edition of their earlier text. It is another sound, somewhat unoriginal, but profusely illustrated text book of general botany suitable for the first year college student. It forms an introduction to the study of both flowering and flowerless plants.

The chapter dealing with the relation of the plant to its environment although short gives a clear analysis of most of the environmental factors. Perhaps a little more space could have been devoted to the pathological side in the chapter dealing with the fungi.

"The Romance of the Apothecaries' Garden at Chelsea." By F. Dawtrey Drewitt, M.A., M.D. Ed. 3. 8vo. xii + 175 pp. (University Press, Cambridge, 1928.) *7s. 6d.* net.

This book of the history of a great London Garden—one of the earliest Botanical Gardens—and of the people who made and cared for it is greatly enlarged from its first edition, and the enlargements have made it the more interesting and valuable. Interesting it most certainly is, both in matter and manner, and in the comments of the author on men and things, always kindly, often acute, never dull. Valuable too for the light thrown upon the place a great garden may make in developing botany and educating people of all types. We feel sure this new edition will do much to enhance the appreciation of the garden in the eyes of all to whom it comes.

"Plant Ecology. The Distribution of Vegetation in the British Isles arranged on a Geological Basis." By Mary A. Johnstone. vi + 185 pp., with 17 figures. (Dent & Sons, Ltd., London and Toronto, 1928.) *5s.*

This is a handy little volume, which is perhaps better described by its subtitle than by the title "Plant Ecology." It is written from the point of view of a geologist, and as such is of value to teaching botanists, especially in this country. After introductory chapters on the scope of Ecology, the modifications of plant form correlated with environment, climate, and soil, of the British Isles, come nine chapters dealing with the correlation of vegetation with various forms of rock. Much use has been made of already published research, which has been carefully selected. A small geological map of the British Isles is included and also a number of good photographs illustrating various types of vegetation.

Though excellent from its own point of view, the book is perhaps apt to lead a student to a somewhat unbalanced conception of the importance of the underlying rocks, since, on considering vegetation as a whole, it is obvious that in many parts of the world the effect of climate is vastly more important in determining the nature of the soil and vegetation than the geological structure.

"The Ferns (Filicales). Vol. iii. The Letosporangiate Ferns." By F. O. Bower, D.Sc., F.R.S. 8vo. 306 pp. (University Press, Cambridge, 1928.) *30s.* net.

This is the concluding volume of this series. Doubtless the author is right in saying the whole work but marks a stage in the detailed investigation of the Class, but that is a very modest appreciation of a very great achievement. Alike in its treatment, its illustrations, and its general "get up," the whole work is a worthy summary of the investigations with which its author has so long been concerned, and one which no student can afford to neglect.

The book is not concerned with the growing of ferns, or with their beauty, but with their structure and affinities, and as such of course makes little direct appeal to the horticulturist.

"Field Book of Common Gilled Mushrooms." By William S. Thomas. 8vo. 332 pp. (G. P. Putnam's Sons, New York and London, 1928.) *15s.* net.

This book was compiled during ten years of spare time collecting, and is written to enable the amateur collector to identify the common forms of gilled agarics.

It contains 128 species fully described, keyed and illustrated, 96 of these being very beautifully figured on 16 coloured plates. There are 34 illustrations in black and white. The book is of pocket size and, although American, should be extremely useful to English students of this subject.

After a popular description of the structure, life history, and reproductive process of these Agarics, the author gives advice on how to collect, examine, and identify them. There is a chapter on how to use the key—after reading this it is easy to follow—and the descriptions of species are very clear. The pictorial key to genera should be especially useful to beginners. Other information given consists of a glossary of terms and a list of botanical names with their meaning, derivation, and pronunciation.

Poisonous species throughout are clearly emphasized and also are discussed in Chapter VI, when dealing with the question of fungi as food. This question occupies the latter part of the book and herein are found special recipes for preparing and cooking most of the edible agarics.

The book is readable and fulfils very well the purpose for which it was written, but the amateur collector will think the price rather high.

"Herbaceous Border Flowers." By H. H. Thomas. viii + 184 pp. 8vo. (Cassell, London, 1928.) 2*s*. 6*d*. net.

This low-priced book is excellent in every way: in the advice it gives, in the selection of varieties to grow, in the printing and in the illustrations. There is, however, an omission from the end of Chapter IV on p. 22.

Some unusual features are the notes on plants that dislike disturbance, and the very just praise bestowed upon the new Astilbes, plants which have as yet scarcely gained a place in English gardens.

"The Easy Gardening Book." By E. T. Brown. 227 pp. sm. 8vo. (Paul, London, 1927.) 2*s*. 6*d*. net.

This is a small gardening dictionary and as such very useful and reliable. The recommendations made are as a rule clear and precise, and the descriptions so far as they go generally accurate. One cannot, of course, find everything in so small a book, but the value of autumn sowing for onions and specific directions as to autumn sowing varieties of lettuce would have been useful. Cheltenham Green Top Beet ought to have been included in any list however short, and Long Red Surrey Carrot might well be omitted, in view of the excellent shorter varieties we now have, with all the good qualities of that first-class variety and none of its drawbacks. We cannot think why 'Arran Chief' is included among *early* varieties of potato, nor why 'Epicure,' 'Great Scot,' and 'Up-to-Date,' still among the best and most reliable of varieties, are not mentioned. The artificial manure mentioned for potatos is quite good, but it should be dusted into the trenches before planting, not applied afterwards.

"Practical Gardening for Children." By O. Marshall. vii + 71 pp. 8vo. (Sheldon Press, London, [1928.]) 1*s*. 6*d*.

This is a book children could read and understand, and is on the whole adequate for the purpose. We could wish, however, that the reasons given for certain work had been more in accordance with the facts *e.g.*, hoeing does not fill up the pores in the soil and so prevent the escape of water; scarcity of plant food is not the main reason for thinning seedlings; and so on. The directions for planting in dry soil in bright sun are not very clear, and to carry the work out as directed would lead to a needless mess.

"The Garden Lover." By L. H. Bailey. 154 pp. 8vo. (Macmillan, New York, 1928.) 6*s*. 6*d*. net.

The veteran plant lover who is the author of this book, and to whom many phases of gardening owe much in America and beyond the limits of America as well, has put much of his own personality into this little book, and has disclosed some of his methods. He tells us of his ideals, and points the way to the furtherance of horticultural activities and all they connote in his own country. The book should have a great influence there, and because it crystallizes so many of the ideas that have furthered English horticulture, it is bound also to be interesting and useful here.

"Krankheiten des Kern- und Steinobstes." By Dr. O. Appel. Part II. 8vo. (Parey, Berlin, 1928.)

This is the second part of an atlas of coloured plates of diseases and pests of fruit trees, and it deals with those of the stone fruits. The trouble and its cause are accurately depicted in colours so that they are easily recognizable, and a short note (in German) gives an account of their courses and the methods to be adopted in dealing with them.

"Popular Hardy Perennials." By T. W. Sanders; revised by A. J. Macself. 402 pp. 8vo. (Collingridge, London, 1928.)

The scope of this book is sufficiently indicated by the title. It is well illustrated by some excellent reproductions from photographs (though some are unworthy), and there are also several coloured plates. Notes on cultivation;

warnings of difficulties; lists of varieties—are all fairly complete though not exhaustive, and the more difficult genera are sometimes too cursorily dealt with, as, for example, Primula. What, by the way, is *Primi la alpina*? The chapter on diseases is very weak. The book is, however, on the whole, a very useful compilation, which many gardeners, both amateur and professional, might consult with advantage.

"Laboratory Manual of Elementary Botany." By E. W. Sinnott. 8vo. ix + 106 pp. (McGraw, London, 1927.) 5*s*.

"No written series of directions or manual for the student, however skilfully compiled, can be successfully used as a substitute for good teaching on the part of the instructor himself." So reads the first sentence of the Introduction, and we suppose every good teacher will agree, and nearly every good teacher find it necessary to draw up for himself, and constantly to modify, the exercises his students are to perform in the laboratory. The author goes on to state some perfectly valid excuses for the publication of the laboratory manual, and into these we need not enter, but on p. 1 we further read that to avoid the degeneration of his work into mechanical grinding, etc., the student "should endeavour to maintain constantly an attitude of thoughtful interrogation." It is just here especially that the wise teacher comes in—and it is his part to stimulate that right attitude in the student—for the average student certainly does not attain to it without the stimulus—rather he regards his exercises as so much work to be got through and then it is done!

After all, therefore, it would be superfluous to criticize the book as a series of exercises. We may as teachers go to it as for inspiration in designing our own work and for suggestions as to means of directing our students in the way they should go. From this point of view we can heartily recommend the book to any teacher of botany, although it has been written especially for American classes.

"The Management of Greenhouses and Frames." By A. E. Livingstone. 8vo. 127 pp. (Lockwood, London, 1927.) 2*s*. 6*d*.

This is a clear and unpretentious little guide to the treatment of plants ordinarily grown in greenhouses, with some necessary and direct remarks upon such questions as watering. We do not find directions to water an Orchid twice a week, or a Begonia once a day or the like, but we do find clear directions as to ascertaining when a plant requires water, and if it does, how to apply it.

"Inorganic Plant Poisons and Stimulants." By Winifred E. Brenchley. Ed. 2. 8vo. x + 134 pp. (University Press, Cambridge, 1927.) 10*s*. 6*d*. net.

We have already noticed this book in its first edition and need merely say that it is here revised and brought up to date without change of form or treatment. The book is a classic on its subject and requires no further recommendation.

"An Introduction to the Chemistry of Plant Products." Volume I. "On the Nature and Significance of the Commoner Organic Compounds of Plants." P. Haas and T. G. Hill. Fourth Edition. 1928. (Longmans, Green & Co.) 18*s*.

The first edition appeared in 1912, at a time when many botany students lacked that knowledge of chemistry which is now incorporated in the science of biochemistry. Now the necessity of a fourth edition has been recognized. Since the third edition it has appeared in two volumes, of which the second treats the subject more especially from a physiological point of view. The amount of information in this well-constructed book of over 500 pages is so great that it is only possible to indicate the various matters through which the authors take us. Section III., following on sections dealing with fats, oils and waxes, aldehydes and alcohols, is taken up by nearly 200 pages on the carbohydrates. Other sections of special interest are on pigments and the colloidal state. The remaining ones are occupied with tannins, glucosides, nitrogen bases, proteins, and enzymes. An appendix, although only ten pages long, gives a concise, clear and readable account of the hydrogen ion concentration and its application to plants and soils. The authors' qualifications are so good and full that this publication may be safely recommended for its wealth of material, its arrangement, and the fact that it is thoroughly up to date.

NOTES AND ABSTRACTS.

[For Index of Periodicals quoted see previous volumes.]

Apple Leaf Skeletoniser, The (Hemerophila pariana Clerck.). By F. V. Theobald (*S.E. Agr. Coll., Wye, Bull.* No. 7, October 1928, pp. 3–10; 5 figs.).—A condensed account is given of one of the less known fruit pests. There are numerous records of its injurious effects in English orchards, whilst its geographical distribution is very wide, being recorded as a pest in many European countries, U.S. America, Canada, and Japan.

The principal food plants are apple and pear, others being hawthorn, peach, sweet cherries, birch, willow, ash, and mountain ash.

Brief descriptions are given of the ovum, larva, pupa, and adult.

The life history is dealt with in detail. There are two broods in a year in this country, the second brood being more numerous and, therefore, greater damage is done by it.

Numerous parasites have been reared from the larvæ and pupæ, including Ichneumonids, Braconids, Chalcids, and Tachinid flies.

The best means of control is to spray the affected trees with lead-arsenate wash to which a fixative is added. The use of tar-distillate washes is insufficient to cope with late emerging pests such as this species proves to be.—*G. F. W.*

Apple Sawfly, How the Ribbon-like Scars on Apples are made by the. By F. R. Petherbridge (*Jour. Pomology*, vol. vii. Nos. 1 and 2, July 1928, pp. 60–62; 3 plates).—A short explanatory account of the peculiar ribbon-like scars formed on the surface of apple fruits by the young larvæ of *Hoplocampa testudinea* Klug.

The scars usually start near the calyx and extend down to the equator, and are the results of tunnellings beneath the skin, followed by the breaking down of the epidermis over these tunnels, and the subsequent growth of the fruit.

Most of the observations were made on the variety 'Worcester Pearmain,' which is particularly susceptible to sawfly attack.

The paper is illustrated by excellent photographs, which show clearly the differences between sawfly and capsid damage.—*G. F. W.*

Black Currant Gall Mite (Eriophyes ribis Westw.), **The Life History of the.** By A. M. Massee (*Bull. Ent. Research*, vol. xviii. Pt. 3, Feb. 1928, pp. 297–309; 1 fig., 2 plates).—A very complete and detailed investigation into the life history of the mite which causes "big bud" in black currants.

The life cycle is arranged under several headings, commencing at the period when the mites enter the developing buds and continuing throughout the year until they re-enter the new buds the following year.

The first part of the paper deals with the past literature of the subject. Some of the more important facts dealt with are: the period over which oviposition continues, the period of migration, habits of the mites following migration, dissemination of mites by wind, insects, birds, and man, and the presence of mites in the soil.

The records of parasitic and predaceous enemies are rather vague, but the chief enemy is a small Chalcid, *Tetrastichus eriophyes* Taylor.

The principal host plant is the black currant, other species of Ribes susceptible to attack being white and red currants (especially the variety 'Fay's Prolific'), the mountain currant (*R. alpinum*), the flowering currant (*R. sanguineum*), and gooseberry.

No definite statement may yet be made as to the degree of immunity to mite attack by certain varieties, as time has proved that so-called resistant varieties have become susceptible. Certain varieties have been incorrectly classed as being immune because the buds fail to swell.

The second part of the paper deals with observations carried on over a period of six years at East Malling by the author.—*G. F. W.*

Bulb mite, Bionomics of Rhizoghyphus echinopus. By W. E. H. Hodson (*Bull. Entom. Res.*, 19, pp. 187–200; Oct 1928; plates).—It is concluded that healthy bulbs are not subject to damage by the bulb mite, but that bulbs damaged by some other means are further attacked and seriously damaged by the mite. The treatment with hot water against eelworms and bulb fly larvæ also kills the mites, but reinfection is easy. Fumigation with para-dichlorbenzene is also effective in destroying the mites.—*F. J. C.*

Bulb Mite, Some Notes on the. By W. E. H. Hodson (*Jour. Min. Ag.*, vol. xxxv. No. 7, October 1928, pp. 656–660).—The author's conclusions resulting from a detailed study of the life history of *Rhizoglyphus echinopus* clearly show that healthy bulbs, under normal conditions of cultivation and storage, do not suffer direct injury from the presence of this mite. Indirect damage may be done by the transference of spores of injurious fungi amongst the bulbs.

Over a period of four years, 1924 to 1927, five hundred bulb samples were examined and bulb mites, in greater or lesser numbers, were found in 95 per cent.

The life history of the mite is briefly described, special attention being paid to the hypopal or travelling nymphal stage. The principal function of the hypopi is the distribution of the mite to fresh breeding grounds. Numerous hypopi have been found on the bodies of various species of bulb fly.

The mites continue to breed throughout the year, the length of time occupied for completion of the life cycle varies according to the time of year, the availability of food, the length of time spent in the hypopal stage, and other factors.

The chief natural enemy of the mite is a species of " beetle " mite, belonging to the family Gamasidae. These predaceous mites feed extensively on bulb mites.

Control measures include: (i) careful lifting—damaged bulbs provide ideal breeding grounds; (ii) destruction of cut and rotten bulbs; (iii) hygienic storage—periodical inspection of bulbs in order to discover and remove all soft bulbs; (iv) early treatment of eelworm-infested bulbs by hot water; and (v) fumigation of bulbs with paradichlorobenzene.—*G. F. W.*

Cabbage White Butterfly, The: and a Simple Method of Control. By F. V. Theobald (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp. 75–78; 3 figs.).—The life history of the well-known pest, *Pontia brassicae*, is given together with its food plants.

Although the amount of damage due to this species is often so severe, yet there is no definite remedy against its ravages. Experiments with varying strengths of salt solution and alcoholic extracts of Pyrethrum have been carried out during the past two years.

The most gratifying results against the larvæ on Brassicas, Stocks, and Geraniums have been obtained with a solution of common salt (2 ounces in one gallon of water) applied by means of a knapsack sprayer. Nasturtiums, however, when growing in full sun showed a considerable amount of damage by leaf scorch.

An alcoholic solution of Pyrethrum was effective and is safe to use, as it is non-poisonous to man.—*G. F. W.*

Carrots, Self-fertilization in. (Einige Versuche mit Züchtung von Mohrrüben durch Selbstbefruchtung.) By J. Rasmusson (*Medal. f. Alnarps Tradg. Fors.*, 1926; plates).—Some plants of carrot proved self-fertile, though most are self-sterile. The seedlings from self-fertilized seed were usually but not always smaller than those from cross-fertilized. The results indicate that pure lines may be raised from individual plants, and that probably the semi-long, cylindrical, obtuse form of Nantes type is dominant over the long conical and pointed type of James or St. Valerie.—*F. J. C.*

Celery Seedlings, A Method of Preventing Damping off in. By H. H. Stirrup. (Lindsey C.C. Leaflet, June 1928, figs.).—It is recommended that 2 per cent. formalin should be used to sterilize soil in which celery seed is to be sown, at least 14 days before sowing. This has been found to protect the seedlings entirely from damping off.—*F. J. C.*

Cherry Fruit Moth, Preliminary Note on the. By F. M. Wimshurst (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp. 86–89; 4 figs.).—A preliminary note on the life history and control of *Argyresthia nitidella* Fabr.

Descriptions are given of all stages.

A calendar is appended to which reference may be made for observing the months during which the several stages may be found.

During August and September the eggs develop, and the larvæ emerge about mid-September, at which time they speedily spin a close web around themselves and hide away in cracks in the bark. So soon as the flower-buds develop in spring, the larvæ enter them and feed on the stamens and petals, eventually penetrating into the ovary.

When mature, the larvæ leave the ovaries in mid-May and drop to the ground by means of a silken thread and spin a cocoon in the soil. The pupal stage lasts from three and a half to six weeks, at the end of which period the moths emerge and return to the cherry trees for the purpose of feeding on the honey glands at the base of the leaves and ovipositing.

Great difficulty has been experienced in controlling this pest, the only possible suggestion being the addition of a soil fumigant round the base of the trees during the second and third weeks in May.—*G. F. W.*

Elm-Bark Beetles, the Relation of: to their Host Trees. By R. C. Fisher (*Forestry*, vol. ii. No. 1, 1928, pp. 53–61; 1 plate).—The results of a year's observations on the economic importance of the larger and smaller elm-bark beetles, *Scolytus destructor* Ol. and *S. multistriatus* Marsh., are dealt with in detail.

These beetles breed normally in felled logs, but it is shown that they take readily to living trees which possess poor or deficient root systems.

Delay in transplanting young elms in early spring has been found to render them susceptible to attack by bark beetles. There is a close relationship between the health and vigour and the moisture content of a tree and its power of resistance to attack by these species.

The death of an attacked tree is not caused by the attack of elm-bark beetle alone, but is usually due to fungal attack following the insects and completing the damage begun by them.—*G. F. W.*

Garden Chafer Attack, A. By T. H. Taylor and W. H. Thompson (*Ann. App. Biol.*, vol. xv. No. 2, May 1928, pp. 258–262; 2 figs., 1 plate).—An account is given of a severe infestation of grassland by the larvæ of *Phyllopertha horticola* L., and resulted from an accumulative attack stretching over a period of ten years.

The life history is explained in detail.

The adult chafers feed on broad-leaved plants, principally buttercup, dock, sorrel and clover, the flowers being completely destroyed. The favourite food is bracken, the young fronds being chosen by the chafers. The symptoms of attack on bracken by chafers and frost are not unlike at a distance.

A method has been devised whereby great numbers of the chafers can be captured during their swarming period. A trap, composed of a wide-lipped scoop attached to a container, is held beneath bracken fronds and the chafers shaken into it. Where this contrivance has been used, further damage by chafer to pasture is eliminated.—*G. F. W.*

Green Capsid Bug, The Common (Lygus pabulinus). By F. R. Petherbridge and W. H. Thorpe (*Ann. App. Biol.*, vol. xv. No. 3, August 1928, pp. 446–472; 8 figs., 2 plates).—So numerous are the complaints of serious damage to currants and other plants by *Lygus pabulinus* in various parts of the Eastern Counties, that a detailed study of its life history was undertaken in the hope of finding data likely to be of importance in economically controlling the pest.

Minute descriptions are given of the ovum, larval instars, and adults. Diagnostic characters are given of the early stages of the common capsid and the apple capsid, *Plesiocorus rugicollis*.

The habits and the time and nature of injury are described.

The host plants are numerous. Sixty-four cultivated plants and twenty-five weeds are so far known to act as hosts.

There are two generations a year. The first generation is found on woody plants such as apple, currants, gooseberry, and rose, and arises from eggs laid in the autumn. During midsummer the bugs migrate to herbaceous plants and there oviposit, the second generation returning to the woody host plants in autumn for the purpose of laying their eggs.

Control measures include: (i) to spray fruit trees and bushes and the ground surrounding them with nicotine-soap wash (8 ounces of commercial nicotine to 100 gallons of water to which is added from 8–10 pounds of soft soap) after shaking the bushes in order to dislodge the bugs—the actual date will vary each year, but a guide is to apply the wash about the time that 'Bramley's Seedling' is in full flower; (ii) fork in weed hosts after eggs have been deposited in them, *i.e.* about the middle of July or rather later; (iii) the use of trap crops, such as potatos, which are cut down and destroyed so soon as the young bugs of the second generation are found on them; (iv) jar the bugs off fruit bushes on to trays or sticky boards.—*G. F. W.*

Hemerocallis fulva. Capsules, seeds and seedlings of the Orange Day Lily. By A. B. Stout (*Jour. Hered.* 17, pp. 243–249; figs.).—*Hemerocallis fulva* does not set seed when self-pollinated and comparatively rarely when crossed with other species and varieties. The capsules, seeds, and seedlings are described and figured. The English variety 'Maggie Perry' is said to be a cross (*fulva* × *fulva Cypriana*).—*F. J. C.*

Insects of Bermuda. By L. Ogilvie (*Dep. Agr. Bermuda*, 1928; fig.).—A list with notes of insects found in Bermuda, with frequent reference to attacks upon cultivated plants and the result of efforts made to control the pests.—*F. J. C.*

Legislation in England against Diseases and Pests of Plants. By J. C. F. Fryer (*Ann. App. Biol.*, vol. xv. No. 2, May 1928, pp.318–328).—The development of English legislation against insect pests and fungus diseases is considered in detail.

The Destructive Insects Act of 1877 and the Destructive Insects and Pests Acts of 1907 and 1927 are discussed.

Information is given on legislation in regard to foreign and resident pests, together with a list of pests scheduled in the Order.

The concluding remarks are a discussion of the whole theme in the light of the evolution of British legislation against pests and diseases.—*G. F. W.*

Lilac Blight in the United States. By M. K. Bryan (*Jour. Agric. Res.* 36, No. 3; figs; Feb. 1, 1928).—A disease of lilacs caused by *Bacterium Syringae* Van Hall, has now appeared in America though attempts to ascertain the course of its importation from Europe, where it has been known for some time, have been unsuccessful. The disease blackens and kills young stems and leaves in the spring and is most severe in wet years. Pruning out of affected shoots is recommended [and it may be added has proved quite an effective measure in England.—Ed.]. The cultural characteristics of the bacterium are given.—*F. J. C.*

Nut Bud Tortrix (Epiblema penkleriana Schiff.), **The.** By F. V. Theobald (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp. 68–70; 1 fig.).—An account is given of a serious outbreak of Tortricid larvæ in the buds of cob-nuts, which occurred near Godalming, Surrey, in May 1926.

This moth is frequently found in the South of England, and is also recorded from Cheshire and Northern Ireland. Its natural food plants are hazel, alder, and, occasionally, oak.

The moth is figured and described.

The larvæ feed in the buds from April to late in May, and move from one bud to another as soon as the bud is destroyed. The opening buds are chosen by the larvæ, which eat them and spin together the younger and older leaves. Both male catkins and female flower-buds are invaded, whilst the fruiting shoots are killed outright.

When mature the larvæ go down to the soil and pupate in delicate cocoons, coated with soil particles.

The pupal stage lasts from five to eight weeks.

A short description of the life history of an allied Tortricid—*Tortrix corylana* Fabr.—is given. This species is generally common on wild and cultivated nuts, on which they fold and spin up the leaves, but seldom commit damage.

Further observations on the life history of the former species are required before control measures can be suggested. If, as it appears, the young larvæ enter the buds in the late winter or early spring, the use of a tar-distillate wash at 7½ per cent. will probably control it.—*G. F. W.*

Pollen tube growth in some species of Brassica. By Tsunetaro Sasaoka (*Hort. Exp. Sta. Okitsu, Japan; Bull.* ii.; Aug. 1928; figs.).—Observations on growth of pollen tubes were made with the partially self-fertile strain of the cabbage 'Toyoda-Wase' and with the compatible cross of that variety as seed parent with the variety 'Baby Head,' and in each case the growth was normal. The pollen tube had penetrated the nucellus by the micropyle within 26 hours of pollination. The incompatible cross of 'Toyoda-Wase' with *Brassica juncea* showed (although the pollen at times germinated) scarcely any penetration of the stigmatic tissue.—*F. J. C.*

Pyrethrum as an Insecticide, English Grown. I. By J. C. F. Fryer, F. Tattersfield, and C. T. Gimingham (*Ann. App. Biol.*, vol. xv. No. 3, August 1928, pp. 423–445).—The introductory remarks deal with the history of Pyrethrum (*Chrysanthemum cinerariaefolium*) for insecticidal purposes.

The cultivation of the plant in various localities in England showed that, for practical purposes, the differences in the toxicity of the samples were very slight.

The flowers, which are ten times as toxic as the stalks, were tested at different stages of development and little variation was observed in the toxicity.

The toxicity to the bean aphis (*Aphis rumicis*) and to the larvæ of the purple thorn (*Selenia tetralunaria*) and vapourer moths (*Orgyia antiqua*) was high. The mature larvæ of the cabbage white butterfly (*Pontia brassicae*) and the cabbage moth (*Barathra brassicae*) proved somewhat more resistant to concentrations of 0·5 and 1 per cent.

The results obtained from applying solutions varying from 0·255 to 2 per cent. to plants infested with aphides and caterpillars are tabulated.—*G. F. W.*

Pyrethrum Experiments. By Martin Austin and F. V. Theobald (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp. 59–67).—An investigation into the efficacy of aqueous solutions of home-grown Pyrethrum against several species of Aphides and against the larvæ of the gooseberry sawfly, ermine moth, magpie moth, winter moth, and the large cabbage white butterfly.

A very marked controlling effect was obtained against twelve species of Aphides which, with the exception of one greenhouse species, were all common pests of fruit and vegetables.

The effect on the larvæ of the winter and magpie moths and the gooseberry sawfly was practically negligible. Against ermine moth larvæ, it was thoroughly effective.

Other factors which have a bearing on the efficacy of the wash are: concentration, effect of weather during and following application and double sprayings.

Preliminary experiments carried out with alcoholic solutions of Pyrethrum show that far better results against the aforementioned pests and against Red Spider are obtained.—*G. F. W.*

Radish growing under different temperatures. (Temperatur og Plentevekst I. Reddek). By A. H. Bremer (*Meld. f. Norges Landb., Oslo*; 1928).—Experiments in forcing radishes in soil kept at constant temperatures, viz., 8°, 12°, 16°, 20°, 24° C. The longer the day the greater the number of radishes matured to the square metre (400 in March, 600 in May). The higher temperatures caused greater leaf growth and reduced the number of plants maturing. The lower temperatures up to 16° C. were most favourable, radishes developing at higher temperatures becoming deformed.

The conclusions reached are that 11–15° is the best temperature for radish forcing, though with sun the air temperature may be allowed to rise to 20°. 12–13° C. gives the best roots with small foliage.—*F. J. C.*

Seeds, soaked or unsoaked. (Bløytt eller ubløytt frø). By A. H. Bremer (*Meld. f. Norges Landb., Oslo*; 1928).—Seeds soaked in a bowl with just sufficient water for the seeds to absorb, for so many days as may be necessary to permit the bursting of the testa of the strongest, at 8–9° C. (48° F.), germinate very quickly after sowing. It was found that with carrots soaked seed gave a larger crop than unsoaked. The soaking is especially important when early crops are desired.
F. J. C.

Tomato Leaf-spot, The Control of. By F. J. Pritchard and W. S. Porte (*U.S. Dep. Agr. Dep. Bull.* 1288; Dec. 19, 1924).—Effective control of this serious disease of Tomatos in warm countries (spores do not germinate below 59° F.) was obtained by spraying with Bordeaux mixture. The fungus (*Septoria lycopersici*) was found to grow on various dead vegetable matters, such as dry grass and the like.—*F. J. C.*

Walnut Drying and Packing in Oregon. By E. H. Wiegard (*U.S. Exp. Sta., Oregon, Bull.* 227, May 1927; figs.).—All the stages in the process of drying and packing walnuts for market are described and illustrated, and an estimate of the cost of the various operations is given.—*F. J. C.*

Lambourne
P.C., G.C.V.O.

[*To face p.* 253

JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. LIV. PART II. 1929.

THE LATE LORD LAMBOURNE, P.C., G.C.V.O., V.M.H.

IT was in the closing days of 1928 that we learned with deep regret of the death of our President Lord LAMBOURNE, who passed away on December 26 at his home at Bishop's Hall, Romford. He was laid to rest in the churchyard of Lambourne, near his old home, in the presence of a congregation many times greater than the little church would hold, while others, in almost equal numbers, attended the Memorial Services in the Church of St. Margaret's, Westminster, and in the Cathedral Church of Chelmsford.

Lord LAMBOURNE'S connexion with our Society began in the year 1904, when as Lieut.-Col. MARK LOCKWOOD, M.P., he was elected a Fellow; he took his seat on the Council in 1914, and five years later, on the resignation of Lord GRENFELL, he became President.

No account of him would be complete which did not, at any rate briefly, tell of the many activities of his busy life and of the positions of honour which he filled, but we may safely say—for we are but repeating what he often said—that of all the honours which became his and carried duties with them, he was most proud of the honour of being chosen President of the Royal Horticultural Society.

AMELIUS RICHARD MARK LOCKWOOD was born on August 17, 1847. After leaving Eton he served in the Coldstream Guards from 1866 to 1883, retiring from the Army in the latter year with the rank of Lieut.-Colonel. In 1892 he was returned as Conservative member for the Epping Division of Essex, and represented that constituency in Parliament for twenty-five years. In 1917 he was raised to the peerage, and subsequently, in 1919, was appointed Lord Lieutenant of the county.

In 1902 he became Provincial Grand Master of the Essex Freemasons, and for many years he was a Director of the L. & N.W. Rly. Company.

His hatred of anything savouring of unkindness led him to become Vice-President and to take an active part in the affairs of the Royal Society for the Prevention of Cruelty to Animals, and his intense love of straightforward dealing made him President of the Prevention of Secret Bribery and Corruption League.

Lord LAMBOURNE made an admirable President. He was tolerant but, when occasion required, firm; willing to listen to all sides, but knew when to apply the closure; not a partisan except when he had definitely made up his mind that a particular course was without a doubt the best for the Society; apt to interject a humorous remark into a discussion, not for the sake of making a joke, but in such a way as to put things in their due proportion.

That same gift of humour coupled with his clear insight and great ability made him an acceptable speaker on all occasions. A solemn function, such as the unveiling of the Memorial to the students of Wisley fallen in the Great War, lacked nothing in solemnity; nor a dignified function, such as the opening of the New Hall, nothing in dignity, when he took a chief part. His visits to the Society's Exhibitions were always looked forward to for the kindly interest he took in everything he saw. He made the humblest visitor and the smallest exhibitor who tried his best feel at home, just as he himself was at home with them and with the Royal visitors who honour our exhibitions at Chelsea and at Vincent Square.

If a difficult piece of negotiation had to be carried through requiring tact and judgment, he was able and willing to undertake it; if a plea had to be put in for the Gardening Charities, he was always a willing spokesman. No matter where, his audience was always eager to take pleasure in what he said and in the way he said it. It is not too much to say that his character was such that he could say more without offence than can the vast majority of men, because always behind his speech was his essential kindliness and friendliness.

Of all flowers probably his favourite was the carnation, and he grew many and grew them well in his garden at Bishop's Hall. Until the death of Lady LOCKWOOD in 1923, he was never seen without a carnation in his buttonhole—as the Press and the caricaturist did not permit us to forget. After that a sprig of myrtle always took its place, cut from the plant in his garden raised from a sprig in Lady Lambourne's wedding bouquet. The wreath of carnations and myrtle which was the Council's floral tribute at his funeral was thus very appropriate.

But carnations were not his only favourites. He had a good collection of tender rhododendrons at Bishop's Hall, and many other greenhouse plants; his outdoor garden was rich in trees and shrubs and herbaceous plants; his fruit houses were well stocked and cared for. He was not a collector. He did not seek to have a plant because of its great rarity, but if it were beautiful then he would have it and do his utmost to grow it well. He liked to see his plants, just as he liked to see people, well and happy, and he spared no pains to compass their happiness. He took just pride in the garden which had grown up under his direction around Bishop's Hall, both for its quiet beauty and because he had planned it.

He was often unwell during the past two or three years, and his great pleasure was to be well enough to see his gardeners and his garden, and one of his greatest delights to be able to make the journey to Wisley and see the Society's gardens there—visits that gave as much pleasure to the staff as they could to him.

In 1925 the Society subscribed for and presented to him his portrait by W. G. DE GLEHN, A.R.A. It now hangs in the room at Vincent Square where he so long and so ably presided over the meetings of the Council. There it will keep in grateful remembrance an able, genial, kindly man who never shirked responsibility, who perhaps unwittingly and largely by his personality alone kept our Society happily united, and under whose guidance it continued to prosper.

REPORT
OF
INTERNATIONAL EXHIBITION OF GARDEN DESIGN
AND
CONFERENCE ON GARDEN PLANNING.

OCTOBER 17-24, 1928.

AN International Exhibition of Garden Design was arranged by the Royal Horticultural Society from October 17 to October 24, 1928, in its Halls at Westminster. The occasion was taken to hold a Conference on the subject of Garden Design, at which a number of papers were read and are now published.

For the organization of this Exhibition a General Committee was appointed consisting of:

Sir WILLIAM LAWRENCE, Bt. (Chairman).
ERNEST CHEAL, V.M.H.
F. J. CHITTENDEN, F.L.S , V.M.H.
R. CORY, F.L.S.
MARK FENWICK, J.P.
T. HAY, M.V.O., V.M.H.
GILBERT H. JENKINS, F.R.I B.A.
E. P. MAWSON, F.R.I.B.A., M.T.P.I.
G. MONRO, C.B.E.
C. T. MUSGRAVE, V.M.H.
W. R. OLDHAM, J.P.
W. REYNOLDS-STEPHENS, P.R.B.S.
J. B. STEVENSON.
H. AVRAY TIPPING.
R. W. WALLACE, J.P., V.M.H.
Sir LAWRENCE WEAVER, K.B.E.
E. WHITE, V.M.H.

Acting under this Committee were Sub-Committees dealing with the various sections of the Exhibition.

The object of the Exhibition and of the Conference was an endeavour to raise the standard of garden planning by bringing it more prominently to public notice by means of illustrations, drawings, photographs and models of different styles of garden planning adopted in various countries, suited to varying conditions of site and soil, and at the same time to emphasize the true function of sculpture in gardens. The general arrangement and the beauty of the Exhibition are illustrated in the accompanying photographs.

The Exhibition * was divided into four sections:

---

* Copies of the Catalogue are still available and may be obtained on application to the Secretary.

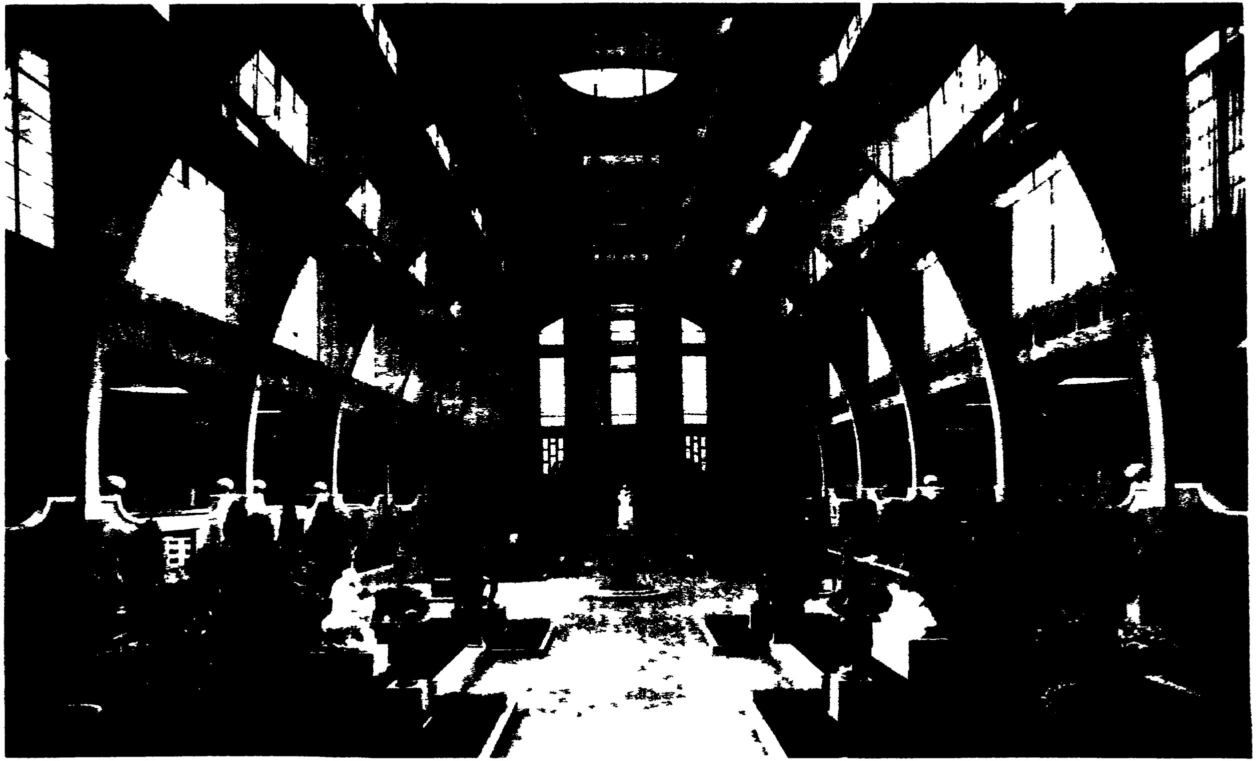


Fig 100 —General View of Central Part of Exhibition of Garden Design.

Reproduced by kind permission of "The Builder."

[*To face p* 256

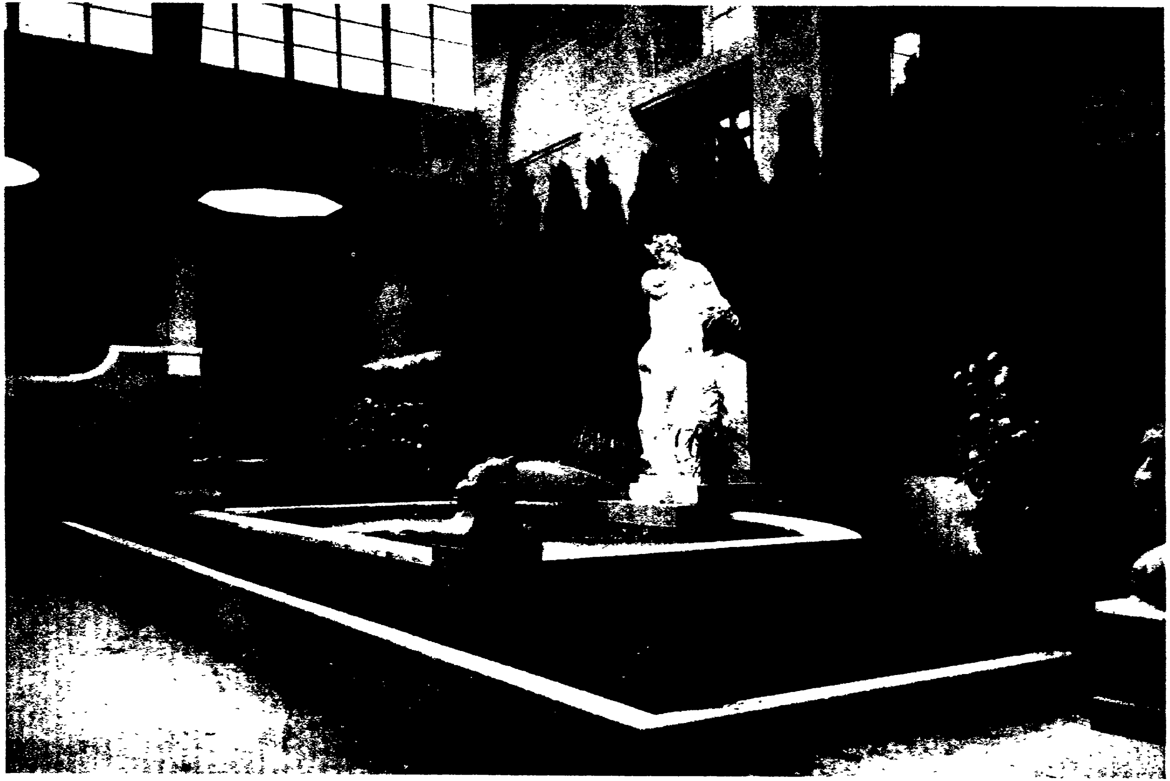


Fig. 101.—The Fountain. Designed by Mr. W. Reynolds-Stephens, P.R.B.S.
Figure by Mr. C. S. Jagger, A.R.A.

1. *A Retrospective Historical Section up to* 1850.—This section was in the charge of a sub-committee, consisting of Mr. E. HUDSON of "Country Life" and Mr. CHRISTOPHER HUSSEY, under the chairmanship of Mr. AVRAY TIPPING, who gave unstintingly of his time and energy to obtain for this section a rare and comprehensive collection of valuable pictures, plans, tapestries, photographs, and books illustrative of the development of gardens in England from 1500 to 1850, and of continental gardens in France, Italy and Spain.

Among the many important and interesting exhibits, mention should be made of the beautiful tapestry, a needlework presentment of a formal garden from Stoke Edith, valuable historic paintings of renowned gardens such as Althorp in 1700; Rose, the Royal gardener, presenting the first English-grown pineapple to Charles II; Clandon Park; the gardens at Claremont; Hampton Court; and the beautiful series of photographs of gardens specially prepared by the proprietors of "Country Life" for the exhibition.

2. *Garden Planning for Town and Country,* organized by a sub-committee under the chairmanship of Mr. MARK FENWICK, J.P., and arranged by Mr. GILBERT JENKINS, F.R.I.B.A., the representative of the Royal Institute of British Architects. This section consisted of selected plans, designs and models illustrative of garden design, displayed in two groups, the British and Dominion exhibits on the east side of the Hall and the foreign exhibits of Belgium, France, Germany, Holland, Sweden, and the United States of America on the west side. Among the notable exhibits were the designs for the gardens at New Delhi of Sir EDWIN L. LUTYENS, R.A.; the photographs lent by the South African Government of the garden and layout of the Government buildings at Pretoria by Sir HERBERT BAKER, A.R.A.; the fine collection of work by American Landscape Architects sent over by the American Society of Landscape Architects; and the collection of garden work which was organized by the Swedish Committee, representing the method of garden treatment in Sweden and especially the work done at the railway stations by the Swedish Railway Administration. Germany, Holland and Belgium were represented by exhibits from a number of their national Garden Architects, and France by a collection of drawings by Monsieur DUCHÊNE.

3. *Sculpture for Gardens and its Setting.*—This section of the Exhibition, organized by Mr. W. REYNOLDS-STEPHENS, President of the Royal Society of British Sculptors, who was assisted by Mr. REID DICK, R.A., and Mr. GILBERT BAYES, F.R.B.S., attracted considerable attention on account of its original aim to display sculpture in the true garden setting. The sculpture section occupied the entire central portion of the Hall, a space of 150 feet by 70 feet, and was arranged as a formal garden designed by Mr. REYNOLDS-STEPHENS. The garden was laid out on a symmetrical plan and consisted of grass furnished with flower beds and trellises. The central avenue led straight to the east end of the Hall where the principal group of sculpture had been placed. This garden group by Mr. C. S. JAGGER, A.R.A. (see fig. 101), was erected behind a pool of water in which

fountains played from the mouths of bronze frogs designed by Mr. REYNOLDS-STEPHENS. At the back a high screen of cypress masked the east wall of the Hall and completed the setting of the garden. Between the main pillars or piers of the building were fitted partitions treated with copings and ornaments and coated to represent stone-walling, which gave a sense of enclosure and added perspective to the view. On the grass and moss plots, pieces of sculpture, works of eminent artists, were set and could be viewed to the greatest advantage. Sir WILLIAM GOSCOMBE JOHN'S statue "The Elf," set on a pedestal standing in a water pool planted with aquatic plants, formed the centre feature ot this garden. Mr. REYNOLDS-STEPHENS' fine figure of "Hope" occupied a central position, and at the other end of the Hall his delightful little bird bath in stone, gilt and bronze surmounted by a crystal globe in which the flowers of the garden would be reflected. The walls were set with relief panels designed by Mr. REID DICK, R.A. At the west end, on the pedestals of the dais, the two companion figures "The Reaper" and "The Sower"* by the late Sir HAMO THORNYCROFT, R.A., formed an attractive approach to the dais on which were displayed the plans and models of the Public Gardens and Parks Section of the Exhibition.

Great assistance was afforded the Society in laying out the garden by Messrs. JAMES CARTER & Co., Mr. JAMES MACDONALD, Messrs. SUTTON & SONS, and CASTLE'S SHIPBREAKING COMPANY.

4. *Public Parks and Gardens.*—Mr. E. WHITE, V.M.H., assisted by Mr. E. P. MAWSON, F.R.I.B.A., M.T.P.I., and Mr. W. W. PETTIGREW, V.M.H., took charge of this section to which exhibits had been sent from thirty-three of the most important public bodies in Great Britain. The object of this section was to provide an opportunity to the public and to officials of municipal authorities of examining plans, models and photographs of public parks and gardens, thus embracing a wide range of modes of treatment of open spaces. The exhibits were staged on the dais and the large models sent by the Corporations of Hastings and Blackpool formed central features.

In the Old Hall an Exhibition was arranged at which firms who were interested in the supply and manufacture of garden ornaments, furniture, etc., were represented.

* * *

The Conference, which was opened by the Rt. Hon. the Earl of CRAWFORD AND BALCARRES, K.T., F.R.S., was carried on during the whole of the Exhibition period. The following papers were read:

1. "The Garden of Pleasure in England from Plantagenet to Victorian Times," by Mr. H. Avray Tipping (p. 262).
   Chairman: The Rt. Hon. Viscount Ullswater, G.C.B.
2. "French Gardens," by Monsieur Duchêne (p. 272).
   Chairman: His Grace the Duke of Marlborough, K.G., P.C., T.D.

---

* This has now been placed in the Royal Botanic Gardens at Kew.

3. "Colour in Garden Planning," by Miss Gertrude Jekyll (p. 282).
4. " Recent Developments in Garden Design," by Mr. Gilbert H. Jenkins, F.R.I.B.A. (p. 284).
   Chairman : Sir Lawrence Weaver, K.B.E.
5. "Fountains and Garden Sculpture," by Mr. Gilbert Bayes, F.R.B.S. (p. 291).
   Chairman: Major-General Lord Edward Gleichen, K.C.V.O., C.B., C.M.G., D.S.O.
6. " A Modern Park, more particularly the Park of Graf E. Silva Tarouca at Pruhonice, near Prague," by Dr. Camillo Schneider (p. 299).
   Chairman : Mr. Mark Fenwick, J.P.
7. " American Gardens," by Mr. Leonard Barron.
   Chairman : Lady Isabel Margesson.
8. "The Small English Garden," by Mr. George Dillistone (p. 306).
   Chairman : Sir Oscar E. Warburg, O.B.E.
9. " Dutch Gardens," by Mr. J. R. Koning (p. 316).
   Chairman : Sir William Lawrence, Bt.
10. " The Place of Ornament in the Garden," by Mr. Christopher Hussey (p. 321).
    Chairman : Lord Stanmore, C.V.O.
11. " Modern Tendencies in the Design and Equipment of Public Parks," by Mr. E. P. Mawson, F.R.I.B.A., M.T.P.I. (p. 333).
    Chairman : Sir Lionel Earle, K.C.B., K.C.V.O., C.M.G., J.P.
12. "Garden Design in Canada," by H. B. Dunington-Grubb (p. 350).
13. " Lantern Exhibition of Public Parks and Gardens," by Mr. W. W. Pettigrew.
    Chairman : Mr. E. White, V.M.H.

* * *

The Society acknowledges with gratitude the friendly assistance and co-operation that it received from the foreign countries interested in the work and more especially to :

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS, United States of America.
Monsieur LUCIEN DE COCK, Ghent, Belgium.
Monsieur DUCHÊNE, Paris, France.
REICHSVERBAND DES DEUTSCHEN GARTENBAUES, Berlin, Germany.
J. R. KONING, Amsterdam, and TH. J. DINN, The Hague, and others, Holland.
FORENINGEN FÜR DENDROLOGI OCH PARKVARD, Stockholm, and ROYAL ADMINISTRATION OF STATE RAILWAYS, Sweden,

for the excellent exhibits demonstrating foreign practice.

The Society also received valuable support from the Dominions with the exhibits staged through the agencies of the Governments of New South Wales, South Australia, New Zealand, and the Union of South Africa.

OPENING OF THE EXHIBITION BY THE EARL OF CRAWFORD AND BALCARRES, K.T.

October 17th, 1928

THE RIGHT HON. LORD LAMBOURNE (President of the Royal Horticultural Society): Ladies and Gentlemen,—You will perhaps excuse my weakness if my voice does not reach the end of this magnificent hall, but I will do my best, and I am sure Lord CRAWFORD will do his best to be heard.

My task is a very pleasant one, and it is fortunate that it is a short one. I have the honour to present to you and to ask for a hearing for my friend and colleague, Lord CRAWFORD. He has kindly, at some trouble to himself—it is always pleasant to cause trouble to other people!—consented to open our Exhibition. Lord CRAWFORD has established for himself in the public mind, and that is always a great criterion of character, the reputation of an art critic and of one well skilled in art itself. I will ask him now to give you a short and interesting address. Anything that comes from him is always interesting. I have had occasion to sit under him, as they say, in another place, and I have invariably come away, not better, but more interested owing to what he has said.

I now present to you a patient, sober, industrious, and learned colleague—Lord CRAWFORD.

Lord CRAWFORD AND BALCARRES: Lord LAMBOURNE, Ladies and Gentlemen,—This is a very interesting and a very important occasion. I believe this is a unique effort to display in this country the relations of sculpture, of garden ornament, and of decoration with horticulture itself, and the Exhibition has been planned with a thoroughness which is typical of the Royal Horticultural Society. Here we have illustrations of garden planning, of garden design, of garden decoration, and we may say that it is a pioneer Exhibition and, as such, important both for the fine arts in this country and for that to which the Society has long directed its strenuous and successful efforts, viz. the cultivation and beautification of our countryside. In that the influence of this Society has been steady, persistent and all-important. But hitherto relatively small attention has been given to the setting of the garden itself. Well, a book should have a fine binding; a picture should be well framed; the jewel should be preserved in a magnificent setting; and we can and we should apply the same principle to our gardens, where we control and cultivate nature.

We are correct in trying to invest our garden with one or other characteristic which we may desire to apply to our architecture. In our architecture we like a sense of interior, of intimacy, of scale, of magnificence, of perspective. Each of these may be less or more properly applied to the garden which surrounds the home; and the garden itself is entitled to claim almost as great a skill and variety as we can apply to the house itself. In our garden the sculpture should be the supplement and complement of our architecture, and the enrichment of the garden and of nature too. And it is particularly in respect of sculpture that this enrichment can be attained. In sculpture British art has made great progress during the last fifteen or twenty years—great and gratifying progress—and I feel that the encouragement given to sculpture by this Exhibition of the Royal Horticultural Society is one for which sculpture, as well as the public, is, and ought to be, profoundly grateful.

We in this country are happily possessed of a mass of gardens which are, I suppose, in some way unparalleled in the world. Let us make the most of them; let us use with care and with discretion the enrichments which sculpture can provide. I am sure that, in doing so, we shall be adding honour to the great art and science of Horticulture.

The influence of this Society on the cultivation of plants for many, many years has been profound. I hope that in the future this remarkable pioneer effort and the influence of the Society upon the arts which can be applied to gardening will be equally great and magnificent.

I beg leave to declare the Exhibition open, and in doing so to express, on behalf of British sculpture (which I know I may do) as well as of the British public, our gratitude to the Royal Horticultural Society.

I.—THE GARDEN OF PLEASURE IN ENGLAND FROM PLANTAGENET TO VICTORIAN TIMES.

By H. AVRAY TIPPING.

Chairman: The Rt. Hon. Viscount ULLSWATER, G.C.B.

THE CHAIRMAN: Ladies and Gentlemen,—The Council of the Royal Horticultural Society has kindly invited me to take the chair to-day at the first of the series of Lectures which are going to be given in this Hall on the subject-matter of the Exhibition which was opened yesterday.

Perhaps you will permit me in a phrase or two to pay a tribute to a friend of mine whose death is announced in the paper this morning, the President of the Royal Academy. I am sure that Sir FRANK DICKSEE had he lived would have taken the deepest interest in the Exhibition which is being held now within these walls. I do not refer only to the pictures of great historical interest in this room, but to the designs and photographs and pictures and exhibits which are to be seen in the other part of the building. During the time that Sir FRANK DICKSEE was President of the Royal Academy, he maintained at the highest level the standard of British art, and those who were personally acquainted with him, as I was, will deeply mourn his departure.

Now it is my duty to introduce to you to-day Mr. AVRAY TIPPING, though I do not think he needs any introduction to those who are fond of gardening and horticulture, for what he does not know about the subject on which he is going to speak to you is really negligible. I suppose he is the greatest authority in England upon the subject on which he will address you.

The combination of horticulture, architecture, and sculpture is of old standing and of close relationship. Curiously enough I was looking through a long list of gardening books the other day which ranged in value from £100 a copy down to 1*s.* 6*d.*, and although I suppose there were some three or four hundred volumes recorded in the catalogue which I was perusing, there were only two amongst all the lot which dealt with the particular subject of this week's interest in the Royal Horticultural Hall. It was time therefore that the particular relations of these three arts to which I have referred should be brought prominently before the public. Where sculpture is to begin and where gardening is to end is a topic not easy to decide, and one upon which no strict canon of law may be laid down; in these matters I suppose taste will rule with everybody, and when we come to matters of taste, well, we are on very delicate ground upon which, indeed, angels might hesitate to tread. Some people do not admire Trafalgar Square, judging by the reports in the papers this morning; other people do. Some people do not even admire the outside of the building in which we are assembled, but I believe there are some who do. In all matters of taste, the selection of what he considers best must be left to the individual.

Without any further delay I have pleasure in introducing to you the Lecturer, Mr. AVRAY TIPPING.

Mr. AVRAY TIPPING: You will have noticed, gathered together on these walls and on those of the room above, a large series of representations of English gardens, so hung and catalogued as to indicate the various phases through which garden craft has passed in this country from Plantagenet to Victorian times. I really believe that this Exhibition tells the tale and that words from me are not needed. Yet so keen is this generation in its love of gardens and its desire to know the past as well as the present of its principles and practices that a lecture on the subject has not been thought superfluous.

At what time in our history does the garden of pleasure make its appearance? Such a description cannot be given to the wort-yards or orchards that existed in Saxon and were developed in Norman times. Yet, anyhow with the advent of the Normans, it was not only herbs possessing nutritive and medicinal qualities that were cultivated in the gardens of important laymen or great monasteries. The beauty of rose and lily, as well as the utility of apple and onion, was recognized even in the days of WILLIAM RUFUS. As to this unsatisfactory monarch, an anecdote tells us how, of the Abbey of Romsey in Hampshire, CHRISTINA, of the blood of the former Royal house of England, was abbess, and with her was her young niece MATILDA, afterwards to be HENRY I's English Queen. RUFUS wished to see this maid; but to such meeting, considering his morals, the abbess was averse, and so RUFUS—as we are told in a contemporary, if continental, account—pretended that he had merely come "to look at the roses and other flowering herbs." Thus we learn not only of their presence in the nunnery garden, but that to come and see them was reckoned a plausible excuse for a visit. We have, therefore, the Garden of Pleasure.

Although utility may still have been the principal object, the monastic Hortulanus was an official of importance, duly appointed to supervise apple-orchard and vineyard, flower plot and herb border; and even of London citizens in the twelfth century we hear that around their houses they had gardens "pleasing to the sight."

Still more in the character of a Pleasaunce will have been the Royal gardens instituted by the first of our artistic sovereigns. We have HENRY III's orders for the development of the Woodstock garden, for the cost of levelling and rolling at Westminster, and a description of walls "good and high" and herbers or arbours "becoming and honourable" that were laid out for him at various of his many habitations.

Again, how much pleasure nature and the garden gave to our poets in the late fourteenth and early fifteenth centuries we know from the verses of CHAUCER and of the first of the Jameses who was King of Scotland. The breath of spring, the scent of flowers, the song of birds fill the heart of CHAUCER with "revel and solaas." Flower-sprinkled meads, such as the tapestry-makers of the day used outstandingly for their foregrounds, are his joy. He is alive to every beautiful garden scene, such as a goldfinch hopping about on a blossoming medlar tree. His little "herber" is set with turf benches where he may spend the summer night and watch the opening of the flowers to the rising sun. The knight Palamon through his prison bars gets a lover's vision of the fair Emilie:

And in the gardyn at the sonne upriste
Sche walketh up and doun, and as hire liste
Sche gadereth floures, party whyte and reede,
To make a sotil gerland for hire heede.

The garden he describes will have been the one he knew so well at Windsor and which JAMES of SCOTLAND, really a captive, sees from his prison window.

In illuminated manuscripts of the fifteenth century we find representations of gardens such as these poets describe. You will see a little set of them brought together as the first item of the Exhibition upstairs. Enclosure is the first essential; gardens, whether or no they belong to castles, are walled or palisaded. A fountain is an essential feature; flowers are set in little raised oblong beds; the herber is often present, but the shade of trees is also sought by those who wish to sit on the turf, flower-sprinkled as already mentioned.

Only from pictures and poetry do we know anything of fifteenth-century gardens, nor have we very much fuller material for the sixteenth century. Gardening phases come and go quickly; masonry, however, is more enduring, and in days when gardens were enclosed and architectural, there was at least a framework capable of survival.

That we find especially at Thornbury, and you will find upstairs, admirably drawn by Mr. G. H. KITCHIN, three pictures representing Thornbury Castle as it was when the Duke of BUCKINGHAM was arrested, condemned, and decapitated in 1521. With these drawings you will find photographic enlargements of what still exists, and it is from that material, together with an unusually full report of exactly what the escheators found when they visited it after Buckingham's death, that the conjectural restoration has been accomplished with a remarkable degree of accuracy. Between the new-built south front of the castle and the churchyard, a space was enclosed by high battlemented but windowed walls, against which was set a two-storied timber erection affording upper and lower galleries. East of this much-enclosed space was a second one, described by the escheators as a "Goodly gardeyn to walke ynne, closed with high walls embattled."

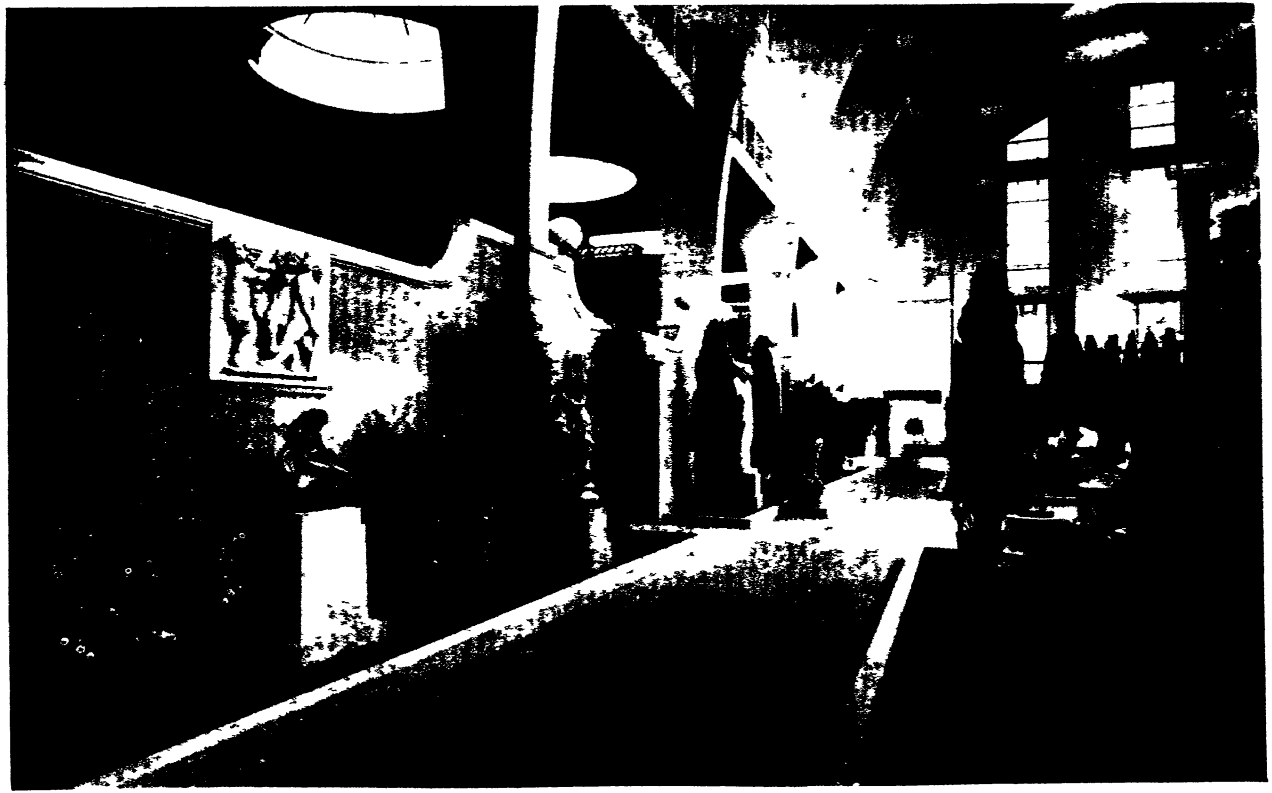


Fig 102 —View of Exhibition. Looking up right side path

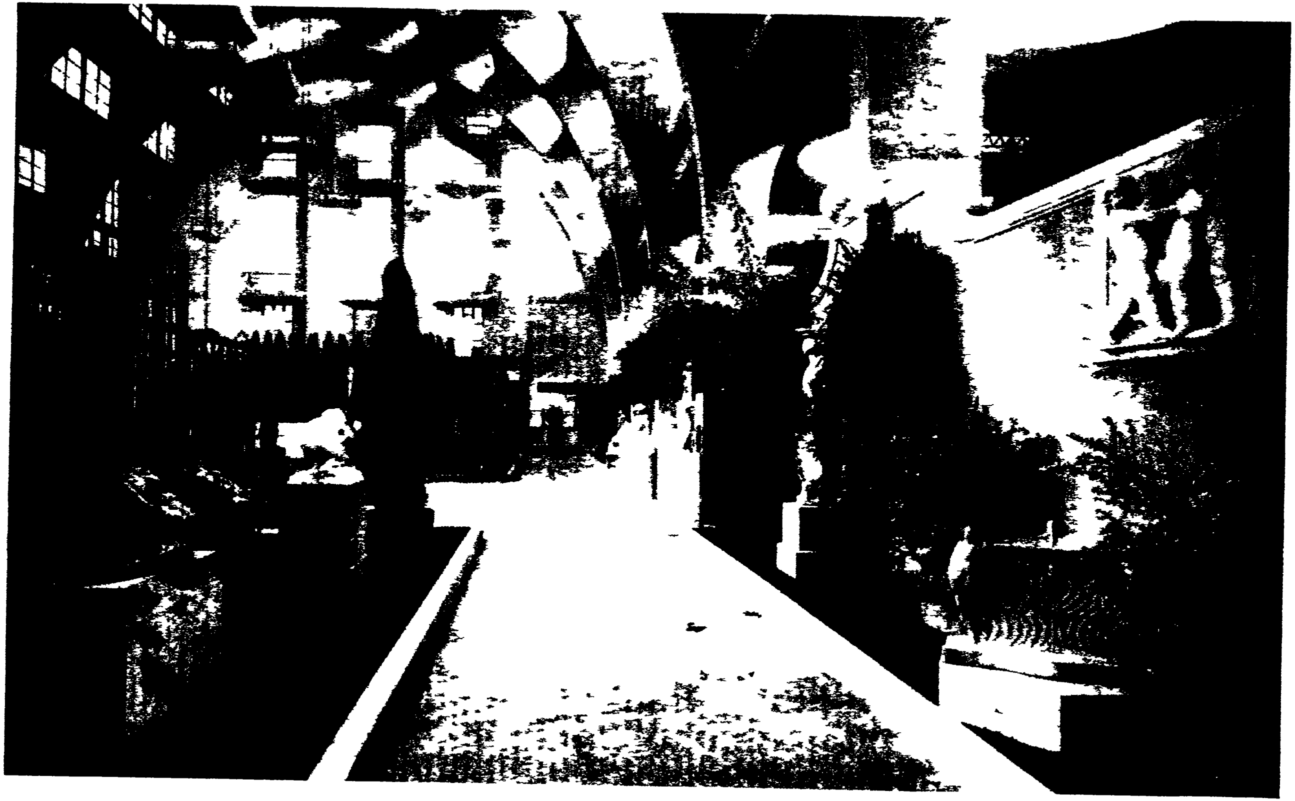


Fig 103 —View of Exhibition Looking up left side path

Beyond that again, and occupying a large space still fully distinguishable, was a ditched and empaled orchard with rose-covered bowers and raised walks, as well as many fruit trees.

This garden of the great nobleman we can compare with that begun by the Cardinal Minister and completed by King HENRY VIII himself at Hampton Court. I have been able to borrow from the Office of Works a large reproduction of the sketch made by WYNGAARDE soon after HENRY VIII's death. From the photographs displayed next to it you will see that the space was afterwards differently treated, except that a sunk garden survives, once enriched by heraldic beasts sitting on plinths. A profusion of these was used. You will see them marking the ascent to the mount, topped by a cupolaed garden house from which a view of the Thames and the country-side could be obtained despite the enclosure of the gardens. This desire for an outlook became general and was accomplished in the sixteenth and seventeenth centuries in two ways: either by the mount, as at Hampton Court, a feature later copied in many places, such as the gardens of Wadham and New Colleges at Oxford, or by raising a terrace against one or more sides of the enclosing wall, reducing it, to those within, to parapet height, although the main area of the garden remained wholly unseen by those without. We find such remaining at Severn End, Littlecote, and Loseley, among other places; while another example is at Montacute. That house was built, towards the close of ELIZABETH's reign, by Sir EDWARD PHELIPS, and its most architectural garden feature is that which lies east of the house, now a garden but originally a forecourt. Due homage had to be paid to the principle of enclosure, but embattled walls are replaced by balustrading, while bastions and corner towers give way to the purely decorative features of garden houses and little temples.

They line the north side of the enclosure, the lay-out of which is better seen from a view taken from the steps leading up to the hall door. North of this enclosure and including the north side of the house is a much larger rectangular feature where the centre is lowered, while along its east side is a raised terrace from which the park and landscape may be enjoyed without those outside seeing within the garden.

Somewhat in the same manner and also with balustrades of Jacobean type is the raised terrace flanked by garden houses that looks out on to the great parterre and house of Drayton in Northamptonshire. The system of a large rectangle with house in the centre, its elevations serving as one side of lesser rectangles, was a favourite garden scheme under the early Stuarts. We find it at Cranborne, and SMITHSON's plans of such gardens at Wollaton and Ham still survive and are reproduced upstairs.

With the growth of gardens and garden interest arose a considerable garden literature. Our writers, indeed, were not very original, borrowing much from foreign sources, especially France. Upstairs, in the first case devoted to books, you will find copies of THOMAS

HILL's treatises on gardens which went through various editions under ELIZABETH. Under JAMES we have GERVASE MARKHAM and WILLIAM LAWSON describing the laying out and cultivation of gardens, whilst GERARD was responsible for the best-known Herbal and PARKINSON described and illustrated the various native and exotic bulbs and plants that he grew in his London garden.

Under JAMES I the garden of pleasure assumed such proportions that the great scale and elaboration of that which Lord BACON describes in his Essay seemed a possibility well within the reach of sovereign or prince, although not attained by anything then attempted in England. Exactly how a large garden was then designed, planted, and cultivated we know from the Hatfield accounts dating from 1609 to 1611. Here were not merely balustraded terraces with garden houses and ample square parterres, but there was a sort of dell or hollow well served by water works and edged by what was probably the last considerable vineyard planted in England. To stock these gardens the premier botanist and plant collector in England was employed. We have the elder JOHN TRADESCANT'S accounts showing how he travelled and what he bought in France, Flanders, and Holland for stocking Lord Treasurer SALISBURY'S garden.

During the Commonwealth the arts were very much under eclipse, but behind the Puritanic screen there was preparation for a new and greater effulgence of both art and luxury. Herein gardening had a great share. The formal style rapidly developed and reached its summit during the reigns of the later STUARTS. That is the period of gardening that you will find most fully illustrated upstairs and of which there is a variety of examples hung on the walls of this room. You have, for instance, ROSE, the Royal gardener, offering CHARLES II the first pineapple grown in England ; a very delightful formal garden and house (unidentified) forming the background.

There is Althorp as it appeared in about 1700, the house brought up to date but still standing in a moat, whilst around it you again see a set of walled parallelograms. Petworth as it was in the seventeenth century and Denham Place as Sir ROGER HILL created it about 1700 follow, whilst beyond that you see some vast canvases by KNIFF who was the draughtsman mainly employed by KIP for the bird's-eye views in his "Britannia Illustrata," of which you will find a copy in one of the showcases upstairs.

By him you first have the old house and gardens at Clandon and then two great bird's-eyes of the gardens laid out for Lord CONINGSBY in WILLIAM III's time at Hampton Court in Herefordshire. The third presentment of this garden, you will see, is attributed not to KNIFF but to a Mr. STEVENS.

Let us see what were the characteristics of this late STUART style at its beginning and at its end. The right-angle and square formed the rock it stood upon. Curves and circles came next, but all irregularities, vertical or horizontal, were taboo. The terrace and the parterre, the massif and the maze, the alley and the arbour, must all fit into such framework. The feeling for enclosure survived, but more and more had it to give way to the desire for outlook now chiefly obtained by the vista. As the period progressed and as the treated areas became larger, it was the vista that dominated. The vista was principally obtained by broad grass stretches bounded by tall hedges or high trees; but water where obtainable was freely brought in as an auxiliary and the view is often along extensive canals. Water also served the fountains, which grew in frequency and grandeur, being accommodated in elaborate pools and basins. Architect and sculptor were as important in gardens as in houses. The temple and the gateway, the figure and the caryatid, the urn and the vase, all play important parts in the decoration of the formal parterre.

The desire to combine enclosure with outlook developed the clairvoyée, as devised in wrought iron by TIJOU under WILLIAM III and freely used by his English imitators under ANNE. The view out being thus attained, an almost American desire for bigness swelled the breasts of the wealthy and art-loving clique that ruled England after the Revolution of 1688 in the field of arts as much as in the field of politics. What LE NÔTRE was doing in France for the Grand Monarch must have its counterpart in England for the great Whig magnates—at Chatsworth for the Duke of DEVONSHIRE, at Badminton for the Duke of BEAUFORT, at Wrest for the Duke of KENT, at Bramham for Lord BINGLEY, and in lesser degree at dozens of English seats that were new-made or re-made at that time.

We know, by what still remains or by what KIP'S engravings show us, the elaboration and extent of this zeal for formality stretching beyond its legitimate and appropriate sphere. That, of course, led to a reaction, but before we glance at the landscape school that follows let us take note of a few examples of formal work.

In KIP'S view of Longleat, you again see a house more or less surrounded by rectangles variously treated but with fountain and knotted parterre as outstanding features. Then, beyond these more or less enclosed squares, the eye is taken out by broad avenues stretching across the landscape.

Of moderate-sized gardens of this time, when formal water played so great a part, nothing better survives than the garden at Westbury-on-Severn.

From the road it presents noble piers topped by huge pines of heraldry and flanking clairvoyées and gates. Through one clairvoyée you may look down a narrow long canal, at the head of which stands a two-storied garden house, loggia below and room above. From that room you get the reverse view; you look along the length of the canal to the clairvoyée, while to the right across a lawn you see another canal—broader and T-shaped.

In the centre of the head of this canal rises a plinth carrying a statue of Neptune. The canal is partly enclosed by high yew hedges and partly open to give a view to the two-storied garden house. On to this has been tacked a modern house, the old one, of Jacobean date and on a different site, having long ago ceased to be.

Between the T-canal and the road boundary is a flower area. It takes the form of a gravel path edged by borders and ends with a single-storied garden house from whence you can see out on to the garden but also on to the road—always a source of interest in old coaching days.

A surviving garden where canal and yew alleys are the leading features is at Ayscoughfee, on the edge of Spalding, to which town it now belongs.

At Holme Lacy we get a good example of a long vista bordered by high yew hedges, while at St. Catherine's Court we note the treatment of a hill-side garden where the absence of water as a feature is not noticed, the attention being riveted by the charm of succeeding terraces with their balustrades and noble flights of steps.

On a far larger scale and where both rapid gradients and water were available were the gardens laid out at Chatsworth under WILLIAM III by the first Duke of DEVONSHIRE. The water temple and cascade are among the features which you will find illustrated upstairs. A view of the west front shows you a finished architectural treatment of a terrace with dignified descents from it. A pedimented central archway gives into a grotto, and the grotto feeling is carried on on each side between the "Busto Heads set in the Neeches"—all the work of the Frenchman NADAULD in 1700.

Also in Derbyshire is Melbourne, where the Charles II gardens were extended early in the eighteenth century. Iron work is well represented by a sort of temple or garden house, the work of BAKEWELL, one of the best of the smiths who carried on the style of TIJOU.

Sculptured vases and boys by VAN NOOST, as you can see upstairs, are the finest garden objects at Melbourne, but the Leaden Slave is also a charming object. Straight walks and yew hedges are framed by noble groves, and through the groves these hedge-bordered grassways extend their long length.

Such effects at Melbourne are modest and homely compared to those at Wrest, where ARCHER's great and elaborate pavilion stands at the end of a canal exceptional in both length and breadth.

Yet Wrest is surpassed by Bramham, which is far and away the most extensive and complete layout in the LE NÔTRE manner adapted to England that has survived the destructive energies of the landscape school. The main enclosure occupies about 100 acres around the house; but the lines are extended across the park into the woods beyond, so that nearly 1000 acres of rolling moorland were brought into the scheme before Lord BINGLEY completed it in 1728.

Its stately pools are set at different levels and framed by one of the noble groves. To make nature conform to the level and straight lines which such a scheme demanded was difficult, and as such schemes got bigger and bigger and more and more quarrelled with nature, men began to ask themselves whether it was worth while—whether, indeed, it were not better to follow and respect the swells and curves of nature than the lines and squares of geometry. With formalism stretching endlessly over the landscape dignity was lost and dreariness began. Used indiscriminately and tastelessly in

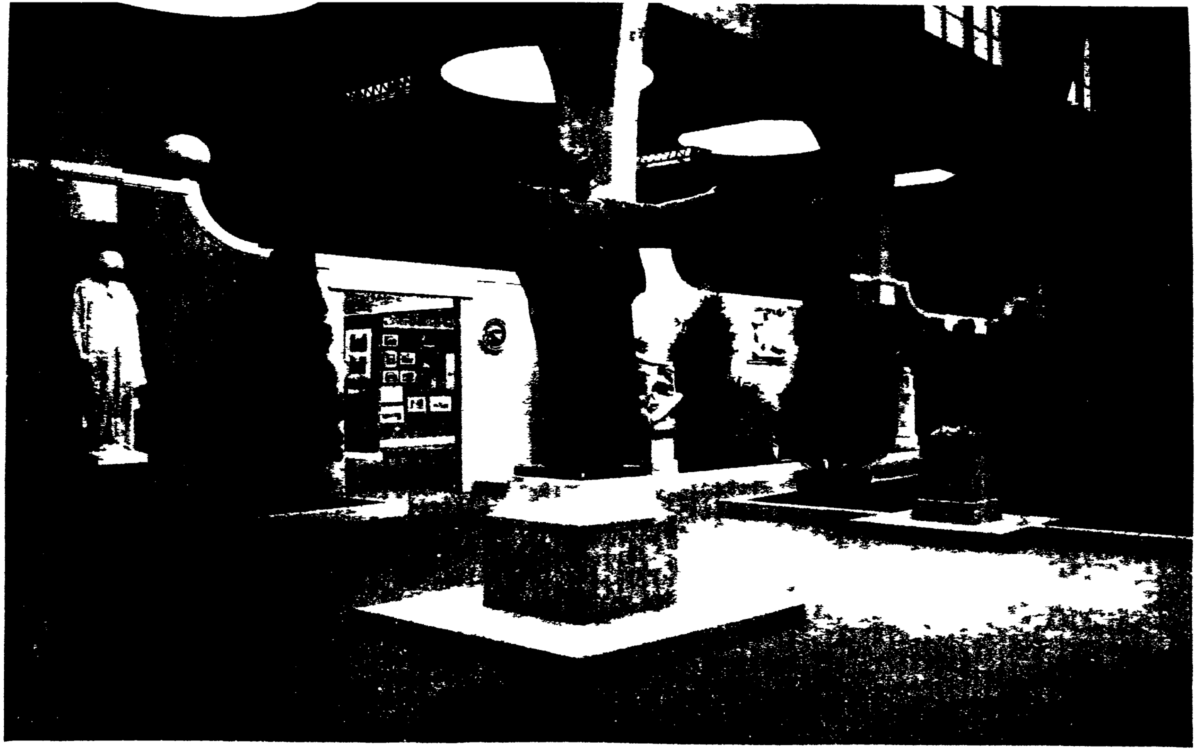


Fig 104 —Near the centre of Exhibition

Hope By W Reynolds Stephens P R B S Silence By W Reid Dick R A

[*To face p* 268

parterres and knots, formalism became freaky and fantastic. Thus it was easy of attack and ADDISON and POPE vigorously used their pens against it. Moreover, a cult for the picturesque, especially as it appealed to such painters as CLAUDE, was growing up, and in the garden realm found an exponent in VANBRUGH, who, while keeping much to formalism in the great lay-outs at Castle Howard and Blenheim, Stowe and Claremont, had an eye for sites with strongly marked natural features. In 1660 JOHN REA had declared that " a perfect level was the most graceful form " for gardens which were seldom " handsome " if they could not be " cast into a level." But under ANNE men began to disprove this view. The almost precipitous slope on the south side of Powis Castle was terraced with admirable effect, and quite a surprising lay-out was contrived at Wootton Lodge in Staffordshire. As you enter the forecourt you have no idea that you are approaching the edge of a precipice. Yet so it is; a rocky spur runs up, setting the house high above the forecourt with rapidly falling terraced slopes at the sides. Behind the house the garden still rises rapidly till it reaches a small pointed platform on which are a little fountain pool and garden house looking down from the craggy height on to a lake below. It is an early and clever combination of formalism and nature. A feeling for natural lines tempered by classic architecture also at this time possessed a friend of POPE, ALLEN of Bath, who, below the stately house and terrace of Prior Park, left the natural slope but set a Palladian bridge across the water at its base.

Under GEORGE II WILLIAM KENT took the lead and carried the picturesque idea further. In this direction he extended and altered what VANBRUGH had done, especially at Claremont, where the gardens he completed about 1740 were painted by ROCQUE, as you may see in the line of pictures kindly lent by Lady CHICHESTER.

LANCELOT BROWN followed KENT and the landscape school triumphed over formalism. Serpentines and swells, belts and clumps, replaced canals and parterres, alleys, and avenues. Romanticism was added to the picturesque, and mossy cottages or sham castles arose from woodland thickets or cedar groves, as at Hagley.

To the landscapists a garden was merely an awkward necessity to be hidden away. The house stood stark amid undulating lawns and winding paths. Only behind screens of trees could a walled garden be appropriately set, to be devoted especially to fruit and vegetables, although, no doubt, some space was left for flowers. But the love of them, which was so strong in the seventeenth century, was seriously checked.

The " many herbes and flowers with their fragrant sweet smells " so cherished by PARKINSON, found little place around the seats of the great, although they survived in modest gardens. Divorced from the neighbourhood of the house and cared for only by the professional gardener, hardy plants and bulbs gave way to tender exotics and there was a great development of glass-houses.

Thus, when unadulterated landscape of the CAPABILITY BROWN type fell into disfavour, it was " bedding out " that became the leading feature of the revived parterre. Such revival is noticeable early in the nineteenth century. Even strong advocates of the picturesque like UVEDALE PRICE—whose seat of Foxley is depicted at the end of this room—concluded that the part of the garden that lay nearest the house might well partake of the character of architecture and that the formalists had only erred in that they trespassed too far into the domain of nature.

A renewed feeling for, and study of, what had been their happier treatment near the house grew up: thus during the first half of the nineteenth-century hedges and covered alleys of clipped yew enclosed formal parterres at Sudeley Castle.

At Penshurst Lord DE L'ISLE, aided by KIP's bird's-eye view, put back the garden to something like it had been in 1700.

At Arley such yew-bordered alleys as we have seen at Holme Lacy were set and soon grew to stateliness. More stately still was the lay-out at Blickling. From the great parterre of flower beds and yew massifs, a wide alley led up the woody slope to a distant temple.

For his great classic houses, Sir CHARLES BARRY devised grounds in the Italian manner, full of architectural treatment and gardened on the bedding-out system which generally left the innumerable beds cut into the grass of parterres a blank not only during the winter but through the spring. BARRY wrought on a large scale at Shrublands, at Harewood, and at Trentham. Much like the great Trentham parterre (now no more) is that at Longford, but perhaps the most successful garden in this mid-Victorian manner is that at Wilton.

The old formal garden lying south of the house had been entirely destroyed by the landscape school, but some of its statuary had been preserved and set about the landscaped grounds. These and much other sculpture were collected for the new garden lying west of the house. Stepping out on to the terrace you see the parterre below you, and walking northwards you come upon another arm of the terrace. Looking west, you see the cleft in the tall yews that marks the broad alley leading to a very beautiful garden house, a re-erected survival of the old gardens.

Such are some of the best gardens devised in England in the middle years of the nineteenth century. They are fine things, but they are not very interesting. They form an excellent *coup d'œil*, a stately setting for a formal party. But they are not an occupation or an interest for a real horticulturist and lover of trees and plants. Well do I remember the garden in which I was brought up: there were shrubberies to be dug once a year in such manner that made the growth of perennials among them difficult and out of place. There were numbers of many-shaped beds cut out of the lawn, showing bare earth for seven months of the year, and only gay during three. Even then they were not interesting. You walked rapidly round, and said it was well done. Then you had finished with them and said that the lawn was well weeded and the gravel paths well rolled. After that another subject of conversation had to be found.

Against this somewhat mindless and often rather vulgar adaptation of early eighteenth-century formalism WILLIAM ROBINSON raised his voice when I was a lad, sixty years ago. He asked for a return to the beautiful and hardy plants that PARKINSON had cultivated and loved more than two centuries earlier, and suggested in his books an infinite increase to their ranks through newer introductions. He taught us to love the form of stately growths, the delicacy of tiny alpines, the charm of woodland and meadow. All that was good. But as one crying out for reform, battling against the narrowness of professional gardeners and their geometrical bedding-out, he went too far in the opposite direction and clamoured against all forms of formal gardening, asking us, even close up against the house, to discard terrace and parterre. Against this view garden-loving architects protested; Sir REGINALD BLOMFIELD and Mr. INIGO THOMAS thundered. But the many garden lovers of England acted as judges and settled the case really in favour of both litigants—both in their own way and in their own sphere were right. Let there be some formalism about the house to carry on the geometric lines and enclosed feeling of architecture, but let us step shortly from that into wood and wild garden. Such are the very catholic views of to-day.

It is not, however, with to-day that I am asked to deal; that is left to others, and I must trespass no further in the modern field. What I ask you to do, in gardening as in other arts and crafts, is to get a thorough knowledge of the rich past into which I have sought to give you a peep. But look round at the present and create a garden that retains some flavour of antiquity and yet uses intelligently and tastefully all that to-day gives you of new forms and new groupings, of choice introduction and beautiful hybrids.

Sir WILLIAM LAWRENCE: Ladies and Gentlemen,—We have listened to a very interesting lecture by Mr. AVRAY TIPPING, and we must be most grateful to him, and to the proprietors of "Country Life" who enabled these beautiful pictures to be shown upstairs and on the screen. I think many of us have taken to a rather popular way of getting about the country that enables us for a very small cost and in great comfort to reach many of these beautiful houses, the pictures of which you have seen on the screen; they can so easily be reached by car or char-à-banc, and it adds so much to the pleasure of seeing these houses if you have learnt a little of their history and development.

I think the ladies and gentlemen who are here to-day owe a real debt of gratitude to Mr. AVRAY TIPPING for giving them something to think about, and when they go to see these houses—nearly all of them are open on certain days in the week through the kindness of their owners—they will say "I remember what we heard at the lecture at the Royal Horticultural Society." I want you to join with me in giving the very heartiest vote of thanks to our lecturer, Mr. AVRAY TIPPING.

II.—FORMAL PARKS AND GARDENS IN FRANCE.

By M. A. DUCHÊNE.

Chairman: His Grace the DUKE OF MARLBOROUGH, P.C., K.G.

THE CHAIRMAN: Ladies and Gentlemen,—It is a privilege to me this afternoon to be allowed to take this chair and to preside at a lecture—I am sure it will be a most interesting lecture—which is going to be given by M. DUCHÊNE. I do not know whether M. DUCHÊNE's name is known to many in this room this afternoon. I am assured by those who are sitting in the front that his name is familiar to them, but some may possibly not have heard of his name, although it is an international name, and to those you will perhaps permit me to describe M. DUCHÊNE and his works.

I have had the pleasure of knowing M. ACHILLE DUCHÊNE now for a great number of years, and during all that period of time that I have had the honour of knowing him, he has developed his art and brought it to such a scale that he is now a power and a force in connexion with the development of gardens.

We all know something of the old French gardens of the days of LE NÔTRE. M. DUCHÊNE's father some fifty years ago decided to try to revive the traditions of the formal French gardens of the seventeenth century. M. DUCHÊNE would agree with me that his father was a genius, and some of that genius has descended to M. DUCHÊNE, his son. It is now some years—a great number of years—since M. DUCHÊNE started to develop and plan on the lines of his father, and he has succeeded in recreating, not only in France but in England and in America, the formal garden of the seventeenth and the eighteenth centuries, based upon the traditions and the architectural lines laid down by great masters like LE NÔTRE and SYLVESTRE.

I have not seen any of M. DUCHÊNE's work in America, but it may be there is some lady or gentleman in this room who belongs to La Société des Amies de la France, where all the latest developments in gardens have been photographed and reproduced, so as to have a permanent record of the works which have been done. I have seen these photographs, but it is not my theme this afternoon to deal with the work which M. DUCHÊNE has done in America.

I am, however, an eye-witness of some of the work which he has performed in France. You all of you know, and I dare say some of you have seen, the gardens of the Château de Vaux, at Vaux-le-Vicomte, the famous garden laid out by M. FOUCHE, the Superintendent of LOUIS XIII and XIV, Kings of France. That garden was designed by LE NÔTRE, and, like many other French gardens during the end of the eighteenth century and notably during part of the nineteenth century, that garden lay in complete ruin, and in a condition of dilapidation. It was M. DUCHÊNE's good fortune to be asked to restore and put it back into the condition in which LE NÔTRE left it. It took him many years of hard labour and of constant attention to the most minute details, but I think we may say to-day—I believe M. DUCHÊNE will bear me out in this—that the garden of the Château de Vaux, so far as it represents the pure, formal garden, is the finest example in Europe of the architectural skill of the great master, LE NÔTRE.

That is pure restoration. You may say any architect, any artist, can restore if he is granted the old lines, and if he is familiar with the old engravings ; therefore that is not very skilful to be able to reinstate that which already existed. But perhaps the greatest garden in France which will go down to history associated with the name of M. ACHILLE DUCHÊNE is the garden of the Château de Voisin. The Château de Voisin is a garden which belongs to the Comte DE FELTS, a Frenchman. The aim and desire of the Comte DE FELTS was an interesting one. It was to create a formal garden such as the French would have made, provided the French Revolution had never taken place, that is to say he wanted to produce and to create that kind of garden which would have emerged by the process of evolution from the time of the architect, MICHE, who was the architect of LOUIS XVI, and such as would have been made by a Frenchman with means at his disposal, presuming that sharp interruptions had not taken place in political, artistic, and emotional thought owing to the outbreak of the French Revolution. Therefore he swept away altogether the thought of emotional gardens and romantic gardens of the period as represented by LAVALLE and ROBERT, and started to reproduce a formal, intellectual garden such as would have existed in his idea, presuming the monarchy had not been destroyed. Having made that decision, he at once went to the man whom he considered to be the greatest formal architect in France, M. DUCHÊNE, and over a period of some fifteen to twenty years M. DUCHÊNE has been working on that garden. Having heard the views of all French critics upon that garden, I think I may say that undoubtedly it will remain as the most interesting document in this generation of a Frenchman combined with the help of a great French architect who has revisualized and reconstructed the kind of garden which would have been made if a great political upheaval had not taken place.

So far as the work of M. DUCHÊNE in England is concerned, perhaps I ought to say nothing, because I cannot stand in front of you for the purpose of blowing my own trumpet and recording works which have been done for me, but I dare say in the course of M. DUCHÊNE's lecture he will deal with one or two points in connexion with work which he has carried out for me.

Let me in conclusion say this to you, ladies and gentlemen, though I have no doubt that among this distinguished Society, the members of which are here present to-day, there are many ladies—note

I specially say ladies—who prefer the romantic garden, there may be some gentlemen here who prefer the formal and the architectural garden. Both have their merits: it would be foolish to try to decide which is the better. Obviously in one place the formal garden is more suitable, equally obviously in the other the romantic and the artistic and the emotional garden is the better, but the greatest art of all, and one which we seldom achieve, is to combine both. If we can get the romantic on the one hand, combined with the architectural features on the other, we have indeed achieved a work of art which will live not only in our generation, but which will be the admiration of generations to come. Those indeed are difficult things to achieve; they have been achieved in the past, perhaps they are being achieved to-day, and they will be achieved in the future. So far as M. DUCHÊNE is concerned, he has attempted both, but I think that his leanings and his training and his traditions are on the side of the formal garden, and those who feel that they prefer the romantic side, I am sure will listen to him with interest, even though perhaps not with enthusiasm.

Sir WILLIAM LAWRENCE: M. DUCHÊNE has asked me to read his paper which has been translated into English, and he will himself explain the pictures as they come along.

THE Royal Horticultural Society has done me the honour of requesting me to give you an account of the position of the art of the garden in France.

It is very difficult to deal with this subject in a single lecture before experts and professionals who will not be content with superficial statements. A popular Conference would be much shorter and more attractive; I must therefore ask the kind indulgence of a section of my hearers if I sometimes find myself compelled to impart to the subject a somewhat technical character.

A delicate question crops up at the very beginning: Ought we to occupy ourselves with *general current practice* in France or should we rather confine ourselves to the work of certain architects who, because they have treated the question of gardens from a special point of view, find themselves privileged and have been called upon, by a select clientèle, to lay out more important gardens during the last few years?

I think it is my duty to speak to you of both.

In order to comprehend where we stand in France at the present time it is necessary to go back to 1878, the date of the commencement of the restoration of the French style in gardens and of the creation of the architectural garden. My father and myself have made every effort to secure the adoption of this style.

Landscape gardening, as a result of the reaction from the architectural garden of the preceding centuries, held sway in France for more than a century; the fashion had its merits, but at the end of the reign of Napoleon III had fallen into utter decadence; the gardens were no more than a travesty of nature. It was merely logical, therefore, that this love of the artificial, the indication of real decadence in landscape gardening, should give rise to a reaction and make way for a more rational conception of the art of the garden.

It needed nearly twenty years for the new fashion of formal gardens—called in France architectural gardens—to triumph, whilst the landscape garden survived merely to mark the transition between the garden proper and nature.

The period when landscape gardening was the fashion had left the gardens, speaking generally, in the hands of horticulturists, garden contractors—usually foremen-gardeners who had set up on their own account—and gardeners from the School of Versailles or St. Mandé. The latter devoted themselves particularly to horticulture, which is certainly one of the most valuable, but it is only one branch of the art of the garden. They were lacking in general education, and their conception of a garden could not, therefore, rise to the level of art.

Up to the beginning of 1902 the constructors of gardens continued mainly to follow the so-called "landscape" school; nevertheless this school had already begun to plan gardens of a so-called "mixed style"; that is to say, they were eliminating the four grass sweeps leading up to the façade and replacing them by geometrically designed plots parallel to the main lines of the house; flower-beds on geometrical lines were introduced in the lawns, opposite the façade. Unfortunately, the relation between the formal garden and the garden treated in the landscape manner was not particularly good, and one was confronted with a hybrid style which possessed none of the qualities of either of its parents.

Moreover, none of these conceptions had produced any really interesting creation.

Since 1900 I have had the great satisfaction of seeing the taste for formal gardens spread and the old landscape style abandoned little by little. It must be admitted, however, that architecturally constructed gardens were usually lacking in interest and were somewhat unsatisfactory on account of the *lack of knowledge of the laws of composition and architecture and an insufficiency of imagination.* Further, even to-day, the designs of French classical gardens are often copied *without sufficient consideration*; the letter of certain compositions is imitated without catching their spirit, whilst on the other hand many architects, when they build a house, work without taking the grounds into consideration and then find themselves in the hands of landscape gardeners possessing very little skill; such architects, themselves without any knowledge or experience in regard to questions of the lay-out of the garden, are unable to collaborate to any useful end with the landscape gardeners or to give them advice and general directions.

Of late years praiseworthy efforts have been made to develop and extend the art of the garden, but what is really needed is to create a proper school for this art; up to the present, time and money have been lacking.

After this rapid glance at general practice, let us discuss certain privileged garden architects whose work is in demand in select circles, both in France and abroad.

The work of these latter is indisputably superior; you will be able to judge of this by the various pictures of their compositions which I will show you. I would merely point out to you that they do not always observe certain laws of composition which I regard as essential, in particular the law of "division into sections"; I mean by that, the constant care which it is necessary to take, where the ground is uneven and in terraces, that the line of vision leading from various points of view does not chance on a motif which, being above or below the line of vision, is partly cut off. It is essential that such motifs should be seen, from these points, in their entirety or, if this is impossible, that they should be completely blocked out.

TOWN GARDENS.

We will now examine rapidly town gardens, large and small houses, and the tendencies of the modern movement.

With reference to town gardens, these follow, I think, the law common to nearly all countries: they are being reduced in number and extent both on account of the cost of upkeep and taxation, and on account of the unproductive capital which their area represents.

Town gardens of small size are to-day always treated in the architectural style. They must harmonize, as far as possible, with the façade of the house. I consider that, in default of size, one must endeavour to impart interest to them by distinctive treatment, that is to say, by the introduction of architectural and decorative motifs. In point of fact, they must be treated like the plantations in a French park which are planned on the scale of the town. They constitute an out-of-doors extension of the reception-rooms of a house.

One of the greatest difficulties is to give these gardens a personal character; this can only be obtained if the perimeter of the garden is planted with trees and shrubs of a height sufficient to hide all the houses or walls with which it is usually surrounded.

All the shrubberies are planted with evergreen shrubs to preserve a verdant appearance in winter.

The motifs at the bottom of the garden, situated opposite the house, such as porches, colonnades, flower-covered pergolas, are carried out, preferably, in trellis-work in the same tone as the green background against which they are silhouetted, to avoid a violent contrast with this background, which would have the drawback of decreasing the depth of the garden.

Generally the centre of the garden is occupied by a bed.

If the garden is very small it is preferable to keep all the middle sanded or flagged and to plant only the outside circumference, leaving a sufficient surface of lawn for the purpose of decoration, which will vary according to the circumstances.

Fountains play a great part in the decorative scheme; they give life and animation to gardens which otherwise tend to be a little dull, but it is essential that the water pressure should be sufficient to make it possible to obtain fine effects.

One should try, as much as possible, to give relief to town gardens by raising certain parts; it is usually the bottom of the garden which is designed as a terrace so that it may dominate the whole. Where the gardens are larger terraces are also placed at the sides. When it is possible to sink the whole of the garden slightly below the sanded or flagged terrace which adjoins the house, a more interesting decorative effect is always obtained.

Of course, the design of these small gardens is infinitely varied; the central beds may be replaced by sheets of water with a piece of sculpture in the middle.

The flowers of town gardens are usually arranged in continuous borders or in beds; these borders must always be placed at the same level as the lawn; they are sometimes, according to the design, arranged in an irregular manner on the grass, forming groups. These groups are themselves so divided as to create repetitions, which have the effect of lengthening the garden and bringing into particular importance the architectural motif in the background. The flowers used must always be of one single colour or of two colours, intended to serve as a reciprocal foil; groups are always single-coloured.

The outer edge of the clumps or groves is, frequently, surrounded by a green hedge of a suitable height in privet, green or golden yew, or box.

When town gardens are surrounded by other gardens, an effort is made to arrange the planting of the outside so as to take all possible advantage of the neighbouring views and thus to create the illusion that the garden is situated in the midst of an immense park.

LARGE AND SMALL RESIDENCES.

Let us now study the manner in which, according to my opinion, it is necessary to design our grounds for large and small residences.

The greater number of French residences have their original ground plan, that is to say, the castle was built during past centuries in a single style; new buildings, on account of the fashion, are also almost always built after an old style.

The lay-out of the grounds must therefore in practice follow the classical garden of the French school. The ground plan comprised a " courtyard " side and a " park " side; the " courtyard " side, by which one reached the house, had to comprise one or more courts, carried out in a style which became the more pronouncedly architectural the nearer they were to the house. These latter were reached by one or more wide paths generally planted with trees; the " courtyard " side was treated with studied sobriety and can be regarded, to some extent, as the vestibule of the house. All the decorative effect was reserved for the "park" side, exactly as it was for the so-called reception-rooms, which were carried out with the maximum degree of sumptuousness. The decorative conception of the "park" side generally comprised a grand central motif (terraces, flower-beds, lawn, water basins, etc.), of which the house formed the axis. This great axis was traversed perpendicularly, at certain distances, by crossed lines, the axes of which were formed by the decorative motifs, the larger and more imposing the nearer they were to the house. The parts lying between these cross-motifs were usually planted with shrubs; in the centre of these shrubberies free spaces were left where more or less decorative garden motifs could be introduced and imagination could have free play.

There exist also in France residences of a different character, for instance, belonging to the Norman, Provençal, Basque style, etc. These constructions are of relatively little importance. The gardens which one designs around them are generally rectilineal.

I will now show you some slides of architectural gardens I have laid out for special clients. They will allow you to appreciate the formula we have created, the formula which has been the starting-point of the present-day orientation of the art of the garden in France. You will note that my method of procedure is, above all, technical; that in the architectural and decorative part everything is foreseen and calculated; that nothing is left to chance; that attention has been paid—in the flat and in the elevation—to scale in systematic juggling with details and to numerous other factors which render the creation of a park highly complex but which, on the other hand, are of assistance in obtaining a certain originality in each design. One thus avoids creations which, although representing an architectural ideal, would have a tendency to similarity. To a certain extent and according to individual conditions, I introduce the French, Italian or English schools; when I say introduce I mean to imply that I make use of them not as a copyist, but by interpreting their spirit.

In certain cases, for instance in the restoration of our old historic castles, I follow closely the French schools, but there is always scope for interpretation, that is to say, for trying to emphasize the character of the period by eliminating uninteresting details. One is thus enabled to restore a park in such a way that it shall possess a more marked character than it had ever had before. If I wanted to make a paradox I should say that "they appear to be more authentic than those of the old days." A number of the old-time creators were merely talented gardeners, in whom the critical spirit was often lacking; it becomes therefore desirable to preserve their naïvetés jealously; even better—to commit some intentional mistakes in order to keep within the spirit of the times, and at the same time always to compose, never to remain a slave to the letter of the rules.

In architectural gardens where there is no question of restoration, we try, above all, to bring out the character, for it is necessary that there should be one—of whatever kind—and then to obtain the maximum effect with the maximum of simplicity. Before everything the line must be taken into account, as well as the perfect grading to scale not only of the motifs in themselves, but also of the various motifs amongst themselves, that is to say, the whole must be to a perfect scale, which will leave nothing to be desired. On the other hand, the parts in proximity to the house must be in harmony with it: they must be designed in the same spirit.

In thus imparting unity the character of the style in question is emphasized, it is given amplitude, atmosphere is created, strength is given to the whole design.

The whole effect (the *ensemble*) of the composition should be definite, clearly arranged, intelligible, regularized; each unit must be objective, must have its reason for existence, without effort or artificiality; this is one of the points which distinguish architectural gardens from gardens of the olden times. The general view of the park from the house must be on the scale of the latter and must give, from that point, its maximum effect and combine synthetically the idea of the architect, the character of the surroundings and of the house, and the psychology of the owner.

Do not let us be afraid of the words clearness, intelligibility, justification, etc.—these words do not exclude imagination; on the contrary, they demand it.

TENDENCIES OF THE MODERN MOVEMENT.

It is impossible for me, on account of the limited time, to enter here into fuller details; it is sufficient to say that so long as private property exists and the desires of individuals remain the same, the future creators of our parks will rely for a long time, either consciously or unconsciously, on these immutable rules.

As regards so-called "modern" designs, it is principally the general programme which will vary in accordance with the needs and tastes of the period. At a given moment, for instance, one will no longer envisage any parks except those responding to utilitarian requirements: sports, open-air theatres, games, etc. . . . it is by the details, by the decoration, by the arrangement and selection (form, character, and colour) of the vegetation employed, that one will be able to modify the present character, that one will give an impression of more modern design. It is not by seeking to abjure existing rules that one will arrive at the "modern," the original, the new; time must be left to do its own work. It is from the changes in our manners, in our mode of living, in our desires, that lasting modifications in the conception of the art of the garden may be expected to arise.

The architectural form, properly so called, of the building is closely allied with the lay-out of the park; these are inseparable, and only a good architect of houses can be a good architect of gardens, and vice versa. It is impossible to construct with intelligence a building on an irregular site and determine the exact levels of its foundations, unless one has previously drawn up a plan for the grounds attached to the house, for it must not be forgotten that the beauty of the views afforded by the garden, as seen from the interior of the house, will depend exclusively upon the height of the latter above the terraces which it should dominate. A very great saving of expense may also be effected by the simple fact that the altitude of the building has been judiciously chosen.

A number of secondary points, also forming the subject of rules, must also be observed if it is desired to obtain good results.

I trust that in the movement towards evolution in the art of the garden, all those rules to which I myself conform will be taken more and more into consideration.

In conclusion, I must say just one word—and that with some degree of sadness—in reference to the tendency towards the gradual disappearance of some of our great estates as a result of the new standard of living. For many reasons these great domains do not appeal to the younger generation.

In the olden days the sole occupation of the lord of the manor was the administration of his domain; to-day the young landowner, occupied with other affairs, no longer desires to be burdened with administrative cares and troubles. On the other hand, the motor car has to a great extent killed the attraction of home-life; I have stated the reasons for this in an article in the journal "La Renaissance."

It is principally in the neighbourhood of the large centres of population that the big estates are disappearing; they are being cut up, parcelled out in a dismal and uninspired manner, to build *bourgeois* villas or working-class dwellings. The château used to be the centre of the social life of the community; one senses the rise of democracy and feels that one day art will be at the service of the community.

In order not to be saddened by this evolution it is essential to raise oneself in thought, in order to view things from above with philosophy.

The art of the garden was born in the sixteenth century when the castle keeps and turrets were perforated with holes for windows, for the desire had grown to have something to look at from the windows. At first the garden was merely a draughtboard and parquets, the latter developing into garden-beds converging on the central axis of the house; next came the brilliant period of the garden in the middle of the seventeenth century, and finally its fatal decadence: a complete cycle: rise, apogee, fall—this is the universal law!

A reaction which took the form of landscape gardening followed and itself became part of another cycle with its rise, apogee, and fall. We are still pursuing a new cycle which will follow the immutable law.

All that is of very little importance, for art consists of a series of consecutive cycles. The important thing is that each of these cycles should open to us a new vista—always wider, always brighter—and that we should reach a formula of beauty which will approach nearer and nearer to perfection in proportion as it becomes simpler.

The CHAIRMAN: I have been asked, and it is indeed a pleasant task, to convey to M. DUCHÊNE on your behalf your thanks for the very interesting lecture which he has given us this afternoon. I feel sure that I am expressing the views of every lady and gentleman here when I tell him we are deeply grateful to him for the lecture which he has given. We are immensely struck by the multitude of the works which during his lifetime he has been able to carry out, we envy him his capacity of being able to spend so much of other people's money, and we tremble to think of the amount of earth which he has displaced from its original position and placed in other portions of the earth's surface where he thinks it is right it should be put. Being English like you all, I know that some of these formal gardens which you have looked at to-day do not strike you necessarily with any very great enthusiasm. M. DUCHÊNE knows well that the English mind is a totally different mind from the Latin mind; the Latin mind is very logical, the English mind is essentially illogical. This fact accounts for the gardens we have seen being so exact: the premises being once stated, the logical conclusions will definitely follow. These gardens do not appeal to the English character, the English mind, and the English sentiment, and therefore I feel sure that although M. DUCHÊNE has explained to us the beauty, the skill, and the ability of his works, he does not for one moment assume that we here in England are going to imitate on a large scale the plans and the drawings which he has submitted to us. Our aims lie in a different direction, our feelings are on a different scale, but this much we do learn, and I think we can assimilate, that whatever the future may hold out—and M. DUCHÊNE asserts in his lecture that it may be that under so-called social revolution the big house will pass away and the large gardens may be neglected, the smaller house may take its place and the smaller garden, and also possibly the communal house and the communal garden in the form of a club or association—if that should happen, if in the future architects are going to be called upon to design gardens either for the State, for the town, for the community or for the association, or for the humble citizen, it may be they will cast their minds in the direction of the paths which M. DUCHÊNE has followed, and when they do try to make these new creations, they will bear in mind that there are fundamental principles underlying all construction, and those fundamental principles have been explained to-day by M. DUCHÊNE in the clear, concise, and I think I may say artistic manner which is his own. We are very grateful to him for having explained those principles, and I feel sure we realize that in whatever garden we desire to work, we cannot ignore the permanent and final principles which have been so ably explained to us here to-day.

M. DUCHÊNE, I thank you most warmly for the lecture which you have given us this afternoon.

III.—COLOUR IN GARDEN PLANNING.

By Miss GERTRUDE JEKYLL, V.M.H.

Chairman: Sir LAWRENCE WEAVER, K.B.E.

THE CHAIRMAN: It is our pleasure now to listen to a paper by Miss JEKYLL which is going to be read by Mr. MUSGRAVE. I am sure everybody will be delighted to know that Miss JEKYLL, with all her burden of years, has so great an enthusiasm for everything to do with the garden that she has been so good as to write this paper, but it is of course unreasonable that we should expect that she should deliver it in person. I therefore shall have pleasure in calling on Mr. MUSGRAVE to read it.

FIFTY years ago, when the bedding-out of tender plants for a summer display was the general garden practice, if any thought was given to arranging them for colour, it was to produce the crudest and most garish effects; such as a round bed of a vivid scarlet Geranium with a border of blue Lobelia, or a wavy ribbon border of scarlet, blue, and yellow. Now that all that concerns the planning of our gardens is engaging the attention of our best designers, the better use of colour is being carefully considered, and is already being gloriously practised. For when colour is rightly used the various portions of the garden will have the highest pictorial value as living pictures of plant beauty.

An example of the better arrangement may be quoted in the case of a large flower border, nearly 200 feet in length. It begins with flowers of tender and cool colouring—palest pink, blue, white and palest yellow—followed by stronger yellow, and passing on to deep orange and rich mahogany, and so coming to a culminating glory of the strongest scarlet, tempered with rich but softer reds, and backed and intergrouped with flowers and foliage of dark claret colour.

The progression of colour then recedes in the same general order, as in its approach to the midmost glory, till it comes near the further end to a quiet harmony of lavender and purple and tender pink, with a whole setting of grey and silvery foliage. No one who has seen or carried out such a scheme, and whose desire it is to have the best effects that the flowers can give, will be contented with a haphazard mixture. Such an arrangement in harmonies is not only satisfying as a whole picture, but, though perhaps unconsciously to the observer, it follows natural laws relating to sight; for the cool and tender colouring is the best optical preparation for the splendour of the warmer masses, and, when the eye has had its fill of this, it receives a distinct sense of satisfaction when it comes again to the cool and restful colouring of flower and foliage. It is like passing from some shady place of half-light into the brilliant glow of hottest sunshine;

and then, when this is almost too burning and oppressive, coming again to the quiet comfort of coolest shade and perhaps the sound of running or splashing water.

Some garden space is often devoted to a special colour, such as the desire for a blue garden. There is some curious quality, not easy to define or to understand, about flowers of pure blue, such as Delphinium, Anchusa, Cornflower, and the useful dwarf Lobelia, that demands a contrast rather than a harmony; for though in a blue garden the colouring can, with more or less success, be made to pass from the pure blues into those of purpler shades, such as those of the Campanulas, yet it is a duller thing than if the pure blues only are used, with the companionship of something of white or pale yellow, such as white or yellow Lilies, white Phlox or pale yellow Snapdragon; or the creamy white of *Artemisia lactiflora* or *Clematis Flammula*.

Sometimes an objection is made—surely an unreasonable one—that as the garden is called the blue garden, there must be nothing in it but what is actually blue. But surely it is a pity to spoil a garden for the sake of a word.

It is much to be advised that there should be some such special place put aside for the best of the Michaelmas Daisies—especially for those of the purest purple colouring—with white. In late September and October, just at the time of year when the beauty of the garden is over, when the general impression is of dissolution and decay, and when leaves of trees are turning towards yellow and brown, it is a rare pleasure and a delightful surprise to come into the clear fresh colouring of purple and white. There are now many fine kinds of the pinkish shades and also some good whites, but for the best enjoyment of the Michaelmas Daisy garden, the cool colouring of the purples is to be preferred; and for white, *Pyrethrum uliginosum*, with its large pure white bloom, is more effective than the white of any of the Aster varieties—after all it is a Daisy and blooms at Michaelmas and may therefore make an honest claim for inclusion.

These problems of colour arrangement are becoming an engrossing study; every year some new or better combination suggests itself, with its certain reward in the following season. Something of the satisfaction of a good conscience rewards and encourages the designer; for surely one of the objects of a good garden is that it shall be pictorially beautiful—that it shall be a series of enjoyable pictures painted with the living flowers.

The Chairman: Despite the enormous output which we have been privileged to have of wisdom from Miss Jekyll for so many years, it is characteristic of her that she strikes a fresh note in a subject of which she is a past mistress, and I am sure it will be your pleasure that I shall write to her expressing your gratitude for having prepared this paper for our pleasure this afternoon, and I know you will wish me to offer to Mr. Musgrave our gratitude for having read it so clearly and admirably.

IV.—RECENT DEVELOPMENTS IN GARDEN DESIGN.

By GILBERT H. JENKINS, F.R.I.B.A.

Chairman: Sir LAWRENCE WEAVER, K.B.E.

THE Conference has already heard a far more eloquent tongue than mine trace the development of the English Garden from the earliest times to the middle of the Victorian Era.

Mr. AVRAY TIPPING has described how the excessive formalism of the late seventeenth and early eighteenth centuries caused a revulsion of taste, which resulted in the Romantic Movement and the birth of Landscape Gardening.

There are few movements in Art which we can claim as being definitely British in origin. Of the few, possibly landscape gardening is the most widely acknowledged by foreigners. The influence of this style of garden design spread over four continents and has persisted to the present day. The movement was intimately connected with the revival of Gothic Architecture and there were only a few of the best-known architects in the middle of the nineteenth century, such as Sir CHARLES BARRY and EDEN NESFIELD, who desired a more formal setting for their country houses than a landscape garden provided. In all art the masterpieces appear to be done without conscious effort, and the landscape composition of CAPABILITY BROWN and HUMPHRY REPTON—once the trees and shrubs had grown to early maturity—successfully concealed the large amount of work expended in their production. This work not only involved great labour in altering the shapes of hills and valleys, damming streams to form lakes, forming ha-ha's, moving trees, and planting shrubberies, to replace the avenues, drives, and formal walks of the garden destroyed, but a great deal of skill in concealing the artifices by which their effects were made. So skilfully did the garden designer efface his efforts that the general public came to the conclusion that no design at all was needed in the making of a garden. Garden design as an art thus fell into disrepute, and this period produced no garden designer of note.

The Gothic Revivalist architect seemed content to let the client's gardener lay out the garden, and the latter was more interested in the new exotics that were then the latest craze. As the lawn was laid out to sweep in curves almost to the walls of the house itself, the gardener was debarred from making any extensive display of floriculture out of doors within sight of the house. It was the fashion to fill a few odd-shaped flower-beds with plants brought on in the greenhouse and bedded out in the spring and summer, Geraniums, Moon Daisies, House-leeks, Calceolarias, Begonias, and Lobelias being the favourite varieties.

To make matters worse the modern conservatory was placed on the best end of the house of the period. This was used as a display house for the flowers grown in pots under glass elsewhere. The owner thus secured a continuous flower show, but the effect on the appearance of the house and pleasure garden was deplorable.

The lawn was bounded by shrubberies. These were originally planned to form a naturalistic pictorial composition, incidentally screening any unsightly feature. The gardener knew nothing of picture making and his shrubs repeated *ad nauseam*—Laurel, Privet, Laurenstinus, Holly—and trimmed to tight conical masses of foliage, robbed the outlook of all interest. The illusion of natural landscape aimed at by the earlier landscape gardeners was destroyed.

This was the position of garden design at the beginning of the period under review. The charm which everyone feels in an old formal garden had disappeared, and there was no longer any merit in the style of gardening which had replaced it.

It was no wonder that those architects, who were again returning to our fine native tradition in domestic architecture, were also attempting to revive the old-fashioned parterre to form a suitable setting for their work and an interesting foreground to the landscape seen from the garden front. Even they, in their work, were unconsciously influenced by the landscape school, for wide, open prospects were aimed at, so that most of the garden could be seen at a glance by walking from end to end of the terrace.

A doughty opponent of this new formalism in gardening was found in Mr. WILLIAM ROBINSON. He advocated a complete return to the true principles of landscape gardening and advocated the use of the many new species and garden varieties of hardy flowers which botanical explorers sent out by the Royal Horticultural Society and others had introduced from the Continent, North and South America, and Japan during the previous century. He was the pioneer of the modern wild garden, and his opposition to the style of garden design reintroduced by the architects resulted in a wordy warfare with them in which much was written on both sides.

Sir REGINALD BLOMFIELD and Mr. INIGO THOMAS opened the affray by publishing "The Formal Garden" in 1892, and designed gardens on the principles they advocated.

In these gardens not only was the lay-out symmetrical and on strictly geometric lines, but great reliance was placed on architectural features—temples and pavilions, stone balustrades and paved walks, carefully masoned flights of steps with moulded edges, fountains, which were monuments of the sculptor's art, set in pools with moulded stone rims—while the planting was deliberately designed to enhance the set formality of the lay-out. Severely regular yew hedges, in which the lines were only broken by arches, balls, or pyramids, were used as the background to beds in which the plants were chiefly of the bedding-out type, being carefully selected dwarf varieties which would not interfere with the full display of the formal patterns of the beds.

This formality was further emphasized by grass borders of even width, and all centres and many angles were punctuated by vases, statues, or cut specimen shrubs.

This formalism, though in nowise carried to the absurd lengths it went to in the beginning of the eighteenth century, was a natural reaction from the faked naturalism of the landscape gardening in the middle of the last century, and it was the type of formalism which Mr. ROBINSON so vigorously attacked.

It was left to another architect—the late JOHN D. SEDDING—to point out that possibly both sides in the heated discussion were wrong, or, at least, only partially correct in their views. He was an original thinker who refused to make his Gothic churches of any particular type or period, and thus converted a revival into a living style. He suggested in the book he published that while it was proper to give a formal treatment to the part of the garden immediately surrounding the house, this formality should gradually relax as the garden neared its boundaries, so that the garden merged into the landscape with no hard and fast division between the garden and its surroundings.

This suggestion is the foundation of all recent garden design, leading to a combination of the clashing styles and resulting in the garden of the immediate pre-war period.

This compromise in the general lay-out gradually extended to the more formal portions of the garden ; while the planning was kept on strictly geometrical lines, the planting became much more varied in height and colour. This resulted in the disappearance of the hard, smug appearance of the formal garden of the previous decades and gave opportunities for greater variety in floral display.

SEDDING also pointed out that the use of the yew hedge enabled the garden to be easily cut up into several smaller gardens of differing shape and treatment, thus greatly increasing the interest and making the whole seem larger, while an added charm was given by the element of surprise. The visitor saw a vista extending into the distance with delightful suggestions of beauties still unfolded, tempting him to investigation and joyful discoveries.

Mr. ROBINSON opened the eyes of people to the wealth of flowering plants at their disposal. The herbaceous border was invented, and the complicated knots of box gave place to formally disposed flower beds.

The formalists pointed out that in the English cottage garden there were growing many charming old-fashioned English garden flowers.

As formality in the outer gardens was to give place to an effect of natural beauty, it was necessary to supplant the more sophisticated types of flowers for the inner garden by the gradual introduction of those of the meadow, woodland, heath, or marsh, many of which were found for the first time to be worthy of cultivation in the garden. This greatly increased the opportunities of the nurserymen, and great developments took place in the range of flowering plants and shrubs to meet the new demand.

For the first time in English gardening, floral display took the pre-eminent place, and many new kinds of gardens were added, each devoted to some branch of floriculture. Commencing from the house, we find the terrace walls were covered with many new kinds of climbing plants, in addition to the Georgian roses, Jessamine, Wistaria, and Magnolia, and the older ivy. We had always had rose gardens, but the pergola—introduced from Italy—gave an impetus to the growing of climbing roses. Many new varieties of Clematis were produced and the beauty of *Clematis montana* and of Polygonum was discovered.

The cutting up of the garden into smaller sections, at first formally divided by yew hedges and afterwards by belts of flowering shrubs, led to gardens for special varieties of flowers or for special seasons of the year being formed—Iris, Primula, Michaelmas Daisies, and Azaleas, to name a few only.

In the outer gardens, the increased appreciation of all species of flowers and the consequent study of their cultural needs led to a closer attention being paid to their natural habitations.

As a result, wood, water, marsh, rock, and heath gardens were added to the list.

To Miss JEKYLL we owe much of the beauty of modern gardening. In her articles and books she has never tired of pointing out that, no matter how beautiful were the flowers, careful selection was essential to combine them into pictures which would satisfy the eye of the artist, and that no garden could be a success where this had been neglected.

At Munstead Wood she lived up to her writings and gave an example of how a woodland garden could be made. While one feels that she believes in formal gardening for the immediate surroundings of the house, it is evident that she also believes in the best kind of landscape gardening for the outer regions. In her book on rock gardens, she has shown how nature should be studied in the placing of the stones. The dreadful piles of rubble or spar stood on end, which the Victorians called a rockery, have given place to gardens which seem to have been lifted bodily from some Devonshire moor or Yorkshire fell. It is doubtful, if in some of the rock gardens which have recently been seen at the R.H.S. Show at Chelsea, the real reason for a rock garden, viz., the provision of a suitable home for the many lovely alpine plants now grown in England, is not being overlooked.

The landscape gardener—driven away from the immediate vicinity of the house—has found that there are still many opportunities for the legitimate display of his art. Hundreds of new species or varieties of shrubs and plants have been sent home by the recent expeditions made by FARRER, FORREST, WILSON, and others, who, besides specializing in Rhododendrons, Primulas, and Poppies, have introduced many new species of flowering shrubs and plants.

This has spurred on the development of the woodland, marsh, and water garden, and there is a danger that our gardens will suffer from an "embarras de richesses."

The formal garden itself has become much more flexible in treatment. Not only is the formality in planning less obvious, but the value of texture in materials and the improvements in planting have been more widely appreciated. This alone would distinguish it from the formal gardens of Victorian days.

Lawn tennis has greatly increased, and the desire to play the year round has produced a new problem, viz. the hard court—a problem not yet satisfactorily solved.

As these hard courts detract from the beauty of the garden—not only on account of their colour, but because of the difficulty of making presentable enclosing nets—they are buried in the shrubberies or placed in yew enclosures which form an excellent background against which to sight the balls.

The conservatory as an adjunct of the house has been abolished and the glass-houses have been banished to the kitchen garden. Here and there one sees attempts to make even this utilitarian part of the garden beautiful to look at. Flower borders for cutting, backed by espalier fruit trees, arched fruit arbours, brick walls, and buildings with stone, thatched, or tiled roofs of good colour and finish have been used for this purpose, but further efforts—possibly on the lines of the old brick-wall garden with its few clipped yews and sundial—might be attempted with no detriment to the fruit trees or vegetables.

The presentable-looking greenhouse seems an insoluble problem owing to the fact that the point of view of the gardener and architect differs so widely. To the latter, the Georgian orangery with a glass roof is a desirable model, but the gardener demands a maximum amount of sunlight, so the glasshouses are now buried in some unnoticeable corner or in a walled garden where their ugliness will not be seen.

I find I have only touched the fringe of some of the recent developments. The elaborately constructed naturalistic waterfalls and cascades are, however, only a revival of eighteenth-century landscape work, as are the lake and river effects, but it is probable that the gardeners of those days did not take so much pains with their waterside planting and they certainly had not the wealth of material now available for their use. The ponds themselves have the advantage of the many varieties of fine water-lilies and other aquatic plants.

In conclusion, I ought to mention the post-war developments. On account of the heavy taxation and the greatly increased cost of everything in the garden—and particularly of garden labour—it has been necessary to cut down the amount of labour required.

The motor mowing-machine has saved many acres of that peculiarly British gardening feature—the lawn; but economic pressure has tended to increase the use of flowering shrubs and to simplify the lay-out so as to reduce the cost of upkeep. However, it is to be hoped that we have not passed the peak of achievement and that our gardens will for many years to come, as in the past half-century, be models which other nations will come to study and emulate.

I hope I am not being biased in suggesting that the great revival in gardening which has taken place in the last half-century is due to the revival of garden design by the architect and the stimulating effect he has had on the gardener. No doubt the best results have been obtained when he is both architect and gardener, or where he knows sufficient of gardening to collaborate with the gardener in perfect accord.

The past history of our gardens supplies evidence that when the architect or the horticulturist succeeds in completely ousting the other from his proper sphere in the laying out of the garden, the art of gardening declines.

It is therefore to be hoped that in the future a still greater appreciation of each other's point of view will be attained, as such a sympathetic understanding can only result in our pre-eminence in the art being maintained.

The CHAIRMAN : The hour is late, but I am sure you will wish me to express to Mr. JENKINS the gratitude we all feel for this exceedingly interesting review of the last fifty years' gardening. I was delighted that he gave due honour to the late EDEN NESFIELD, who certainly did a great deal to revive the proper association between architecture and horticulture in the garden. I should have been glad if Mr. JENKINS had said a word for a still older and greater name, that is the name of PHILIP WEBB ; in 1859 PHILIP WEBB, whose greatness as an architect we are only slowly beginning to discover, was associated with WILLIAM MORRIS in building that house to which MORRIS took his bride in 1859. PHILIP WEBB is the first architect so far as I know—it is a good many years ago : he died at well over 80—who divided gardens, in order to get continuation of interest, by yew trees, so that you have a series of gardens, rather than one large garden which can be seen at one view. I think we should not forget what PHILIP WEBB did in that respect. " Clouds " was a great example ; he partly solved the conservatory problem which has been such an extraordinary trouble to architects and garden designers.

The reference to the great battle between Sir REGINALD BLOMFIELD and Mr. WILLIAM ROBINSON reminds me of a thing which pleased me more than a little. I am a little vain of the fact that Mr. WILLIAM ROBINSON once did me the great honour of referring to me as " merely one of REGINALD BLOMFIELD's acolytes." But the humour of the situation as between BLOMFIELD and ROBINSON is this, that when Sir REGINALD BLOMFIELD built himself a country house, he happened to put it on the side of a cliff, and it was impossible for him to make a formal garden ; and when Mr. ROBINSON bought a new residence, the only practical solution of his problem was a formal garden, and he proceeded to lay out a very beautiful one. The truth is that the site has a very great deal to do with the sort of garden that ought to be created in any position.

Mr. JENKINS has written his paper round the text of "Let us now praise famous men for all they have done for us in the past fifty years," and I should like to add a few names.

INIGO TRIGGS was a brilliant fellow. The great JOHN GIBSON, who was associated with Mr. MAWSON in so much work in the Lake District, is a very great name that ought not to be forgotten.

Then there is the late ERNEST NEWTON, who did wonderful gardens; Mr. McCARTNEY, still happily with us; Professor LETHEBY, who put a formal garden round a lovely brick house. There is Mr. GUY DAWBER, happily with us; he has put beautiful gardens round many country houses. There is Mr. MORLEY HORDER and Sir REGINALD BLOMFIELD, and I would like to say for the information of those of our foreign friends who are here, that of course it was impossible for Mr. JENKINS to give everybody's work on the screen.

Mr. JENKINS showed a very interesting series of slides, but there are a great many people who during the past thirty or forty years have done fine gardens. We had a few of Sir EDWIN LUTYENS. There was a very poor photograph of a garden pool at Folly Farm. Mr. JENKINS said very justly he would like to see that after a few years' growth, but Mr. JENKINS does not know that I had that photograph taken sixteen years ago for the express purpose of showing the lines of the pool before planting was begun; therefore, of course, the picture has very justly revealed the necessity of planting architectural features in an adequate way.

There is a point that I may add about that very charming little picture of Mr. TIPPING's topiary walk at Mathern Palace. The point was rather that those yews were the growth of seven years, and seven years only; that photograph was taken in order to demonstrate the idea that you can have a yew garden or a topiary garden under a lifetime, and people with good courage can set out to have a fine topiary garden without fearing that they will have to wait until they are old before they can see the result.

It is getting late and I will not detain you any longer after this very admirable lecture that Mr. JENKINS has given. Without further remarks I will therefore express to Mr. JENKINS your very grateful thanks for having taken the trouble to read this admirable paper and collect such a number of slides illustrating this very interesting and burning subject.

V.—FOUNTAINS AND GARDEN SCULPTURE.

By Mr. GILBERT BAYES, F.R.B.S., H.R.I.

Chairman: Major-General Lord EDWARD GLEICHEN, K.C.V.O., C.B., C.M.G., D.S.O.

THE CHAIRMAN: It should hardly be necessary for me to introduce to you our lecturer this morning, for his work is very well known. He has carried out many important works in statuary in England and in other countries, not so much in the open streets of London—there are only one or two there—but he has done a good deal of work in Australia and in India and in a great many other places in England. As I say, it should be hardly necessary to introduce Mr. BAYES, but the unfortunate thing is that British sculpture and British sculptors are not so well known in England as they should be. Unfortunately, sculpture seems to be an art which is not greatly appreciated. Over in France sculpture, and especially garden sculpture, is much more appreciated, and you see many more figures over there. It should be the same over here, but at the moment it is not so.

Exhibitions of sculpture are held at the Royal Academy and elsewhere, but one sees very few people in the sculpture rooms, they all go to see the painting rooms. One reason for this, of course, is that the sculpture is so badly shown in these various exhibitions. The space is insufficient, and in a place where there really should be from fifteen to twenty pieces of sculpture or statues, there are crammed fifty or sixty or even a hundred. That is largely the reason why this exhibition has been got up, in order to show that sculpture can very properly be used for garden purposes. There is no place in the world like a garden for showing sculpture, for there you can get the proper light, the proper colour, and the proper atmosphere.

Mr. REYNOLDS-STEPHENS, who is, as you know, the President of the Royal Society of British Sculptors, has organized this Exhibition of Garden Sculpture in connexion with the Royal Horticultural Society, and it is very much to his credit. He has had very hard work in carrying it out, but with the help of Mr. GILBERT BAYES and Mr. REID DICK, I think he has produced an exhibition of great beauty downstairs.

Mr. GILBERT BAYES: Lord GLEICHEN, Ladies and Gentlemen,—My subject is Fountains and Garden Sculpture, and it is such a big one that I can only touch upon the fringe of it to-day. In the past most fountains were executed either for the purpose of supplying water to man or beast, or for the cooling of the hot air of the summer, and whether we look to Greece, Rome, great Babylon or the Italian Renaissance, we find that they filled a most important place in the lives of the people, and even to-day when we travel abroad it is still the fountains that we remember as being refreshing notes in our journeying.

Here with us the water tap and the Water Board have in the bulk of cases usurped the fountain's first function, and our climate renders them less necessary for the second purpose than in many other countries. Shall we then say we have no need for fountains? Hardly, I think, for it is a fact that the love of moving water is ingrained in most of us. It is one of the delights and wonders of childhood, and it lasts on throughout life, whether it be the swirl of the sea, the great waterfall or the quiet rivers of nature, or whether it is the spray from the man-made fountain falling in diamonds in the sun, or whether it is the small artificial pool. To all of us it comes as a charm, taking our thoughts away from the cares of the day by its gaiety, or quieting our unrest with its still reflections. Yes, I think that in our world of rush and with our crowded streets we perhaps need it more than ever before, to remind us that there is something besides hurrying from place to place, and perhaps to point out a philosophy bigger than the day's work.

Among the great fountains that have come down to us many spring to mind: those in Rome and her environs, Tivoli and Frascati, the charming fountain in the Boboli Gardens in Florence, and right through Italy the tale is well-nigh inexhaustible. France supplies many instances equally beautiful, but on rather different lines. In many cases in the Italian gardens the remains of the sculpture is not much, it is rather the great basins, the cascades and the water channels that remain to delight us by their scale, and I am not putting these on the screen to-day, because I think they are dealt with by other lecturers at other times.

For the sake of convenience, I propose to divide the fountains roughly into three classes: the utilitarian, those primarily for supplying water for drinking, etc., including with those well-heads that form such a decorative feature in the courtyards and cloisters; second, the big park fountains of public or private ownership; and third, the smaller ones for the private owners of more moderate means.

Among the utilitarian I would place high in the list the big bronze one in the public square at Perugia (fig. 105). I would like to point out the simplicity of the design of this; it is big, but very simple to construct. In that day such a big fountain, from the founder's point of view and also from the sculptor's, was rather a serious undertaking. It is designed in three tiers: at the top a delightful little bronze headpiece throws out a quaint set of jets; the water flows into a small circular basin and so cascades into the next and then comes out in smaller spouts to the lowest. There is really no big piece of casting; it can be divided anywhere into reasonable-sized castings and you have the whole thing supported solidly on columns. Down below you have panels enriched, and instead of the "saints" device, you have pilaster columns fluted in various ways. The pride of the cities when those fountains were put up was very delightful and a very great lesson to us.

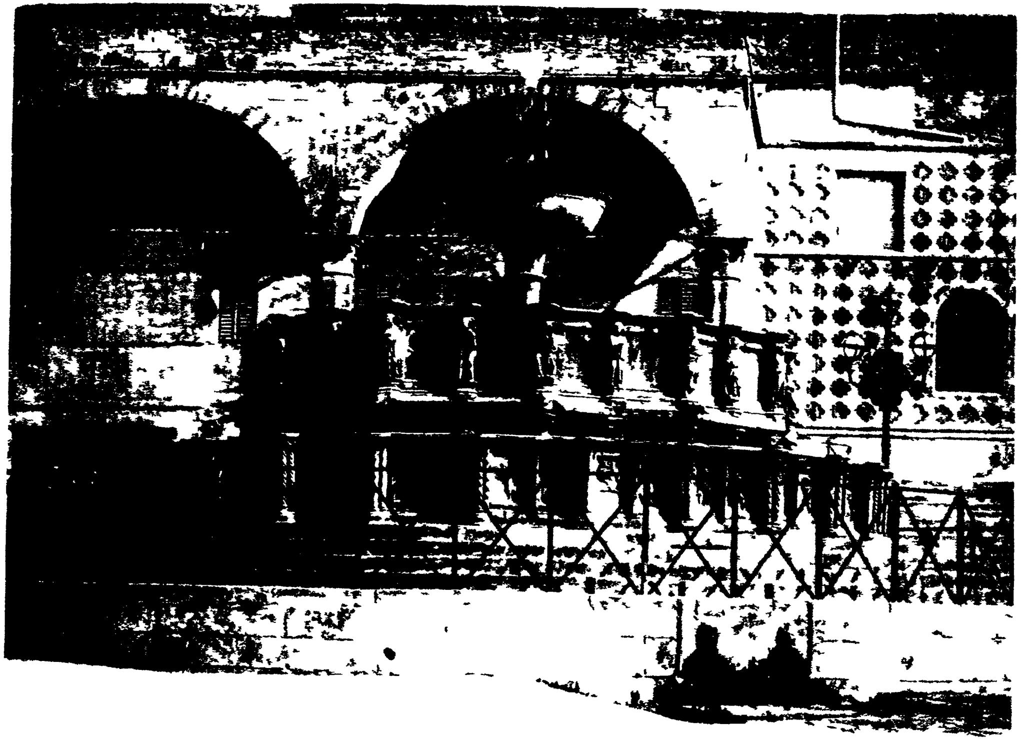


FIG. 105.—THE FOUNTAIN AT PERUGIA

[*To face p.* 292

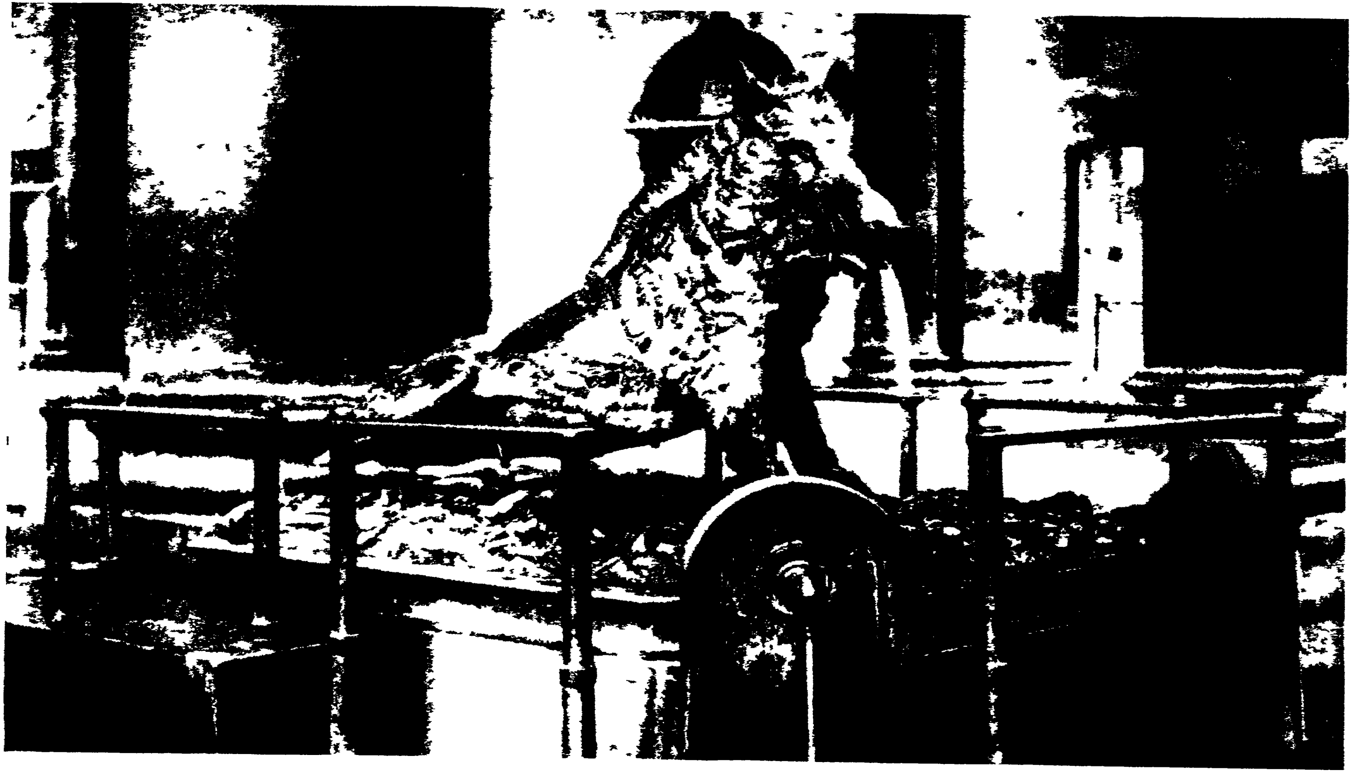


Fig 106—The Bronze Boar at Mercato Vecchio Florence

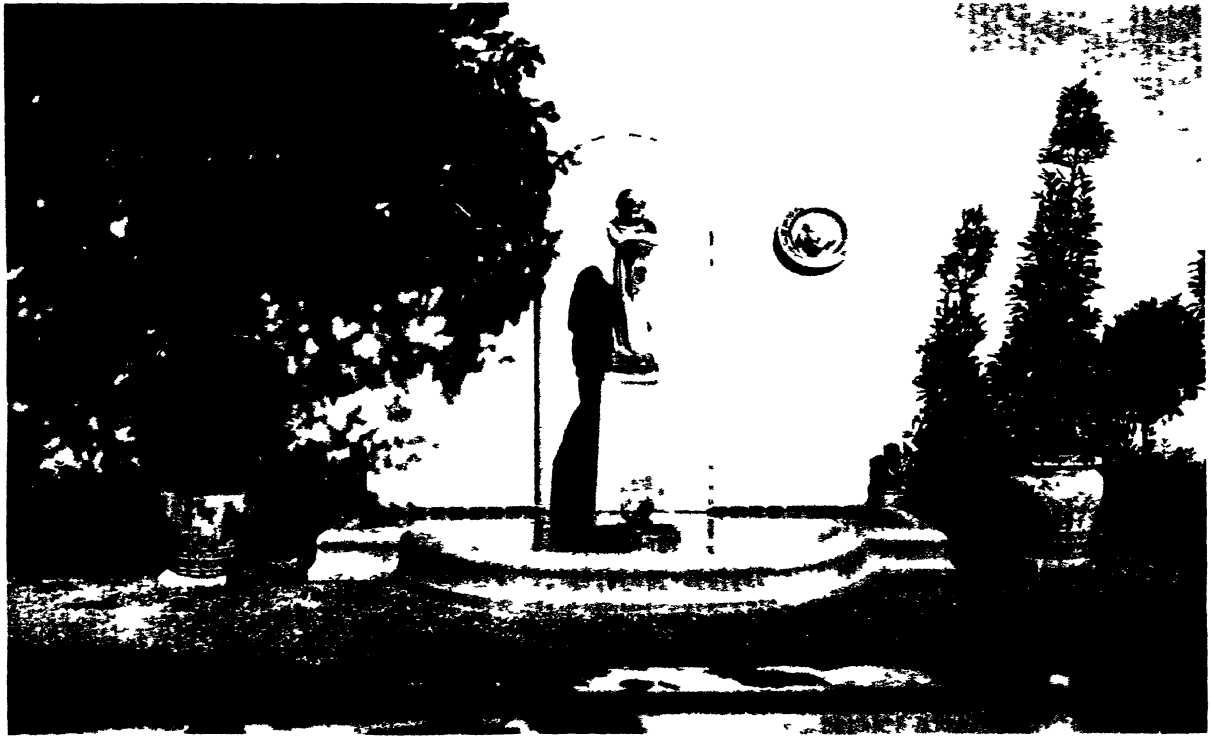


FIG 107

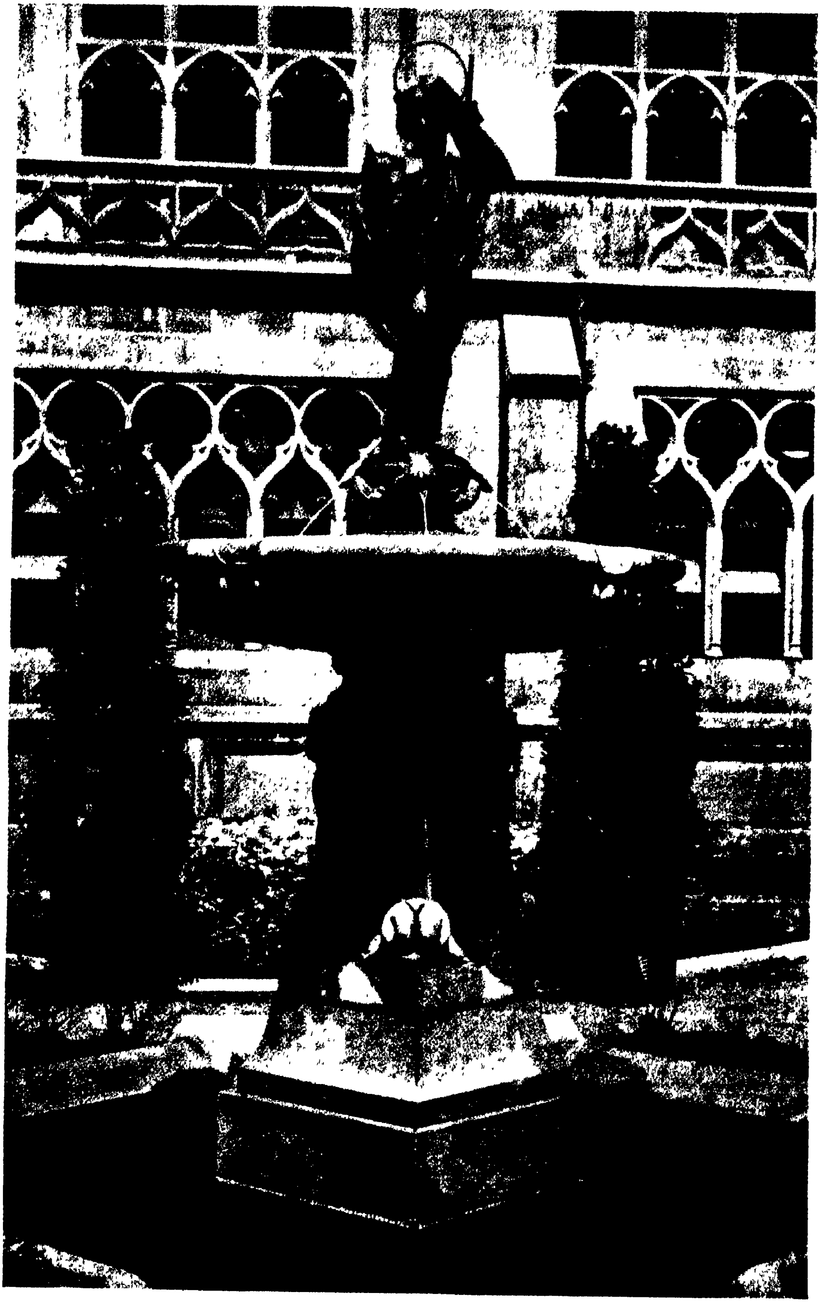


FIG. 108.—THE FOUNTAIN IN THE MERCHANT TAYLORS' COMPANY'S GARDEN, THREADNEEDLE STREET.

[*To face p.* 293.

At S. Martino in Naples, you have a typical well-head. There are two supporting columns for the chain pulley, copper jugs which are such a great feature right through Italy, and an iron grill supporting the jar when it comes up on the pulley.

In Puliciano and in the Piazza is a very beautiful one, carrying a big coat-of-arms. Again there is the hook with the pulley, and the cover, with the opening in the centre of the cover through which the jars are pulled up. That is typical of thousands right through Italy.

Another form you get very often in connexion with the churches and which the della Robbias did so beautifully in hundreds of cases. There is a cistern and in some instances a whole row of taps. In the simplest you have a single tap with a sink below and a washing basin. Some are all marble, and many in other materials, but all are beautiful, and it is a great pity they cannot be used more than they are now.

Another form of well-head, not unlike the earlier simple well-head, has the pulley supported on wrought iron instead of marble or stone columns, and it has added to it a windlass, which is slightly more complicated. At times a very clumsy piece of covering is placed at the top for resting the water jars on.

A later development from the two-column form has a light cross-piece above it, and it is sometimes elaborated in four columns and finished with four basins and four spouts of water and a little jet in the centre; it is rather an interesting development from the simple form of well-head of the ordinary courtyard.

Those in the Doges' Palace, Venice, you may remember, are very elaborate, and in that case a mass of bronze, but generally the well-heads are in stone or marble.

The bronze boar (fig. 106) from the old Mercato Vecchio, in Florence, shows something a little more on realistic lines than those so far referred to. It is a very delightful thing and a very wonderful piece of cast work, but it comes in quite a different category from those we have been examining.

The Gooseherd from Nuremberg has an iron grill round it, and it struck me as being rather a delightful thing as enriching and enlarging the effect which might have been a little isolated with the slight figure; the grill round it, with rather elaborate ornamentation up above, makes it something extremely charming.

In a courtyard at Palermo, as far as I can judge, what has originally been a fountain basin is now filled up with flowers; the Triton is not blowing water any longer, but he still comes under the heading of fountains, and there is very little doubt that the pool here was originally used to dip out water for watering flowers; it is getting back again to the rather naturalistic treatment and less architecture, but the courtyard is really delightful.

At Monreale is one of the most fascinating little fountains I know. One is inclined to say at first that it has no natural forms in it at all—that it is purely a piece of abstract form. At first glance it is, but actually you would find the little figures and heads forming the globe give it its richness. It has quite a slim basin in a very simple style, with a number of steps going down, giving it a character quite apart from anything we have previously seen. It is one of the things which I personally am immensely fond of, and it shows how simple a shape can be satisfying. Some larger fountains, very broken up in line and so on, will come to mind; they are elaborate, done by much more capable people, but lack the simplicity of the one at Monreale.

In referring to the Trevi fountain in Rome, I want you just to take yourself to task a little. Lord GLEICHEN has said sculpture here does not receive very adequate appreciation, yet people who have been in Rome are always telling you how beautiful the fountains are there. I want you to consider a little whether they are as beautiful as they are made out to be. My own feeling is that we are away for a holiday, the sun is shining, there are no troublesome letters in the morning to remind us of work, we are really out for a good time, and when we see fountains we say " How wonderful! If only we could have them in England!" As a matter of fact, to be quite honest and if nobody will throw anything at me, I think that is a very bad fountain. Mind you, I enjoyed it, and I always throw my soldi in so that I can go and see it again in the approved style, but all this sudden outcrop of realistic stone breaking out from the classic form of the building, this wonderful crowd of mermaids, sea-horses, and Heaven knows what, although very capable, is not great work, and it is only the delightful climatic conditions and the fact that we are on holiday that make us not realize that it was not a really great mind at the back of it. When you are judging these things, I think you should put things in their proper perspective. We are not Italian, therefore a thing like this strikes us rather differently.

I must now refer to two that are typical of a great many fountains in Italy. One is in Bologna. There is plenty of it—figures all over the place, wrestling and struggling, only just propped up—one does not know why they do not fall. One thoroughly enjoys it, but again I have a strong suspicion that we really could do very much better to-day given the opportunity; but when one sees it, it is still very notable with the blue sky, and, if it is a festa-day, plenty of water.

The next is on the same lines, but is a little more elegant in treatment. There are more and more figures, in fact there seems really no end; whenever the builders have been puzzled as to what to put in, they have put in a whole crowd of figures, and if they went a little higher, they have put in another basin, and a crowd of figures, all capable things but rather restless.

Another, I think, the little one down the Tiber, is built up in something of the same way, but on simpler lines, and you have single figures at the intervals instead of crowds. This is a simpler form of the same theme as the last, but shaped in a very elaborate way.

In the Borghese Gardens is a fountain which has no great work in it from the point of view of sculpture traditions. There is nothing like the capability in it that is shown in the three previous works, but it has still the three basins, and underneath, when you are looking at the actual thing, you can scarcely see the sea-horses, so covered up with green are they that they are hardly recognizable as such. The point I wish to make is that the thing is so right for its place; whoever did that had absolutely the right outlook for fountains. In the Borghese Gardens there are three principal fountains, each one quite different from its neighbour, none of them as sculpture, a great work, but each so absolutely suited in scale, proportion and material to the particular setting that it is absolutely an education to look at them. That is one of the things that I think more than anything else we have got to watch and work for in fountains—scale and general treatment for the position it is to occupy. Work itself may be as beautiful as you like in detail, but if it is not in scale and if you are going to lose the good qualities which water can give you, you have failed in the fountain. You will often find men with the right outlook for fountains and traditions, their work is not so great *qua* studio work, but when they put it into its setting, you feel it is a thing joyous and for a garden.

In the Villa Visconti di Modena is a fountain typical of a very great many French fountains. It is just the opposite of those which we have been referring to, which are piled so high. There are big basins, with the family of Tritons and spouts all over the place, very enjoyable things and working on quite different lines from those we have seen; they demand quite a different type of setting. Of course all fountains are delightful: while I have been criticizing these others do not think I do not enjoy them, but some seem to have more qualities than others.

We are now turning to relatively modern work. In the 1889 Paris Exhibition was a fountain where the sculpture is non-existent: the very florid building is covered with something, but you are not quite sure what it is, whether it is sculpture or gingerbread. It is one of the cascade type, but again it is quite a type apart. There is a base which does not matter to the thing that is spouting, the rather florid architecture, and the great flow water which comes back from the spouts, and the animals which drive inwards.

Another by COUTEAU, and in the same Exhibition, was rather a different type of fountain again. This is one of the very crowded family type, piles and piles of figures, one feature dominant (in this case it is a boat, but sometimes it is some other method of progression), with the idea that it is all being pulled through the water with a crowd piled on top. I think possibly that is typical of the formal Exhibition where a big show is made, but the thing will not last for very long.

In a fountain by BARTHOLDI you get a crowded, but different type. There is a chariot with a principal figure in it and various subsidiary bending figures, and then horses in front, all charging along; it is simply violent action from one end to the other and water spouting all over the place. This is again one of the crowded type that you often get in squares. I do not think it is the most beautiful form of fountain, but you can afford to get more action and, shall we say, nervous movement in a fountain with water playing than possibly in any other form of sculpture.

There is a modern German cascade in Hamburg which shows you a fountain with certain reliefs, but you can almost say it is pure architecture—it shows interesting forms that give you the cascade, quite the opposite type from the first French one I referred to.

There is a most charming and elegant fountain in Hyde Park by the late Lady FEODORA GLEICHEN, and my quarrel is that it is railed off from the public. You cannot get near to it. It is one of the most delightful fountains we possess, and yet you can only look at it from a distance. I think that is where we are making a very great mistake in London, let us say, because I know London so much better than the rest of England. We will not let our people get intimate with our sculpture; we always seem to think it must be a thing to be kept apart. If you go abroad there is none of that feeling at all. We do not seem to trust our people, everything gets railed round, you must not get near it; you must not get really close up to it so as to love it. I do think, also, that whoever is responsible for the lay-out that is round it has just failed in conveying the thing which is so necessary and so wonderful, a sense of scale. A little more intimate planting round this would give us what we so often lack in our London Parks, and until we get that sense of intimacy and scale in our minds, we shall not really get the best out of the work which the sculptor has done and has given to us. I think that we ought to realize that it is not impossible to train our people to respect these things; to put a railing round a thing to keep them out is the worst way you can do it. When once they are shown that these things are put up for their own pleasure and delight, I think you will very soon teach them to treat the work properly, but as long as you shut them out in this ridiculous way, we shall never really get to know the things we have got in our midst.

To carry this idea further let me call to mind the wonderful fountain by CARPEAUX that was finished by FRÉMIET, as CARPEAUX died before it was finished. It is at the head of the Luxembourg Gardens, just in front of the Observatoire. Let us consider for a moment how it is treated, and that will give you a little idea of where my grumble comes in. The ground is made to drop away slightly on the other side in the most fascinating way, and, if you start from the other end of the Luxembourg, you are taken up a couple of big double avenues of chestnuts with beautifully clipped and kept, well-watered lawns with flowers in the centre. This great double avenue carries right up past two roads, two roads cross it, but the avenue is unbroken; it goes straight up, and you go up this restful place and when you come to the end you are faced with an absolute gem of a fountain. That is the way the thing should be done. I know of no better example. I have been told by people who should know better that we cannot do these things in England. Why not? We could clip the trees and water the lawns, we can do everything that is done there. The whole thing is, we must have foresight and exercise imagination, and we have got to spend perhaps a little more in looking after it, but if you have got a beautiful thing it is worth looking after, and it repays itself a thousand times.

There is another little one in the same garden—I was going to say quite a ridiculous one; the group is a very feeble thing. I personally do not like little grotto treatments. The lay-out of the ground is such that part of the wall is higher than another, with the result that the water seems to be running uphill; yet it is the most lovable thing you can come across. There are always rows of people sitting in the sunlight here and enjoying it, whether in the early spring, or in the heat of summer, or in the autumn; even when the leaves are down, in winter, it is one of the most charming and refreshing things you will find in a day's march. It is not impossible to do things as well as that if only you have the right spirit.

There are in Pompeii a couple of small fountains which just show you how nice a small bronze will look in a garden. I always feel that Pompeii was not unlike our own civilization, a little on the cheap side, with small gardens and not very big houses. I think we might learn a lot from the way things were done there.

Possibly one of the most loved of the Renaissance works is in the Palazzo Vecchio, Florence and is by VEROCCHIO. It is most delightful, but the subject is not very suitable when copied in lead—you notice it is standing on one foot—often bad casts are made, but the original is a most delightful thing, and absolutely to scale.

There is one of my own, and I must apologize for mentioning it, in the Merchant Taylors' garden in Threadneedle Street (fig. 108). The fountain itself from the basin downwards is not mine, it was there originally and is more or less formed on one in Kensington. John the Baptist is the saint of the Merchant Taylors' Company, and from there upwards (pointing) I am responsible for it. It is delightful to come into a paved little courtyard in the middle of the City, and find, out of the rush and noise, a garden; it gives you a delightful feeling of rest, and it only shows how important fountains are to-day.

[Several slides were here shown illustrating the sculpture exhibited in the Hall placed in the garden for which it was designed.]

* * *

What we have tried to do in this Exhibition is to suggest to you that the work of the sculptors is not only for use when you are dead, but that it may be a joyous thing for you whilst you are still alive. We want to bring our efforts into intimate touch with the life of to-day.

Our councils are waking up to the need for lung space for the people; we are hearing about green parks and things of that sort. Is it too much to ask that we should be allowed to do something towards beautifying them? After all, as I have shown you in one or two cases, they do it abroad even to-day, and the people who are there enjoy it, and if we are quite honest we enjoy it as much as they do when we go over there. I want to know why we should be afraid of it in our own homes and in our parks. To you I would say—because many of you cannot have parks in which to put things up—that much as we admire the past, a bad cement casting of some antique work which has been reproduced some thousands or tens of thousands of times, even in a garden, may become monotonous to yourself and to your friends, and I think it should be possible to find something done by the people of your own time that is worth having.

The only other thing I have to say is, that we sculptors immensely appreciate the opportunity that the Royal Horticultural Society has so generously given us in this matter, and I hope you will enjoy the Exhibition.

The CHAIRMAN: Before we close I want to make one practical point, and it is this: a week or two ago I was talking to a gentleman, a large landowner down in Sussex, with beautiful gardens of his own, and I was telling him about this Exhibition which was coming off, and he said, "I am so sorry not to have heard about it before, because I wanted some garden sculpture, and I did not know who to apply to, and now I have bought it." "Who from?" He said, "Well, I went up to London, and I turned into the nearest establishment which was selling sculpture and I bought it straight off. If I had only known of this Exhibition, I should most certainly have gone to it and purchased some really good sculpture by a really good artist." I think that shows rather a want in the way of people who do need sculpture. Therefore, I am glad to tell you that arrangements are being made, and when anybody wants really good sculpture for their garden or grounds, they have only to apply to the Royal Horticultural Society, and they will put them in touch with the Royal Society of British Sculptors who will supply figures and so on of what are required. They can get a really original piece of good British sculpture instead of an ordinary trade reproduction such as you will see by the thousand in all our gardens. I think that is something.

Now I have nothing to do but to convey to Mr. BAYES your thanks for his excellent and instructive lecture on the subject of Fountains and Garden Sculpture, and I think we might couple with that our sincere thanks to Mr. REYNOLDS-STEPHENS, who has arranged this Exhibition.

VI.—A MODERN PARK

MORE PARTICULARLY THE PARK OF GRAF E. SILVA TAROUCA AT PRUHONICE, NEAR PRAGUE.

By Dr. CAMILLO SCHNEIDER.

Chairmain: Mr. MARK FENWICK, J.P.

THE CHAIRMAN: Ladies and Gentleman,—I need not say that I feel extremely honoured and gratified at being invited to take the Chair to-day, and to welcome so distinguished a lecturer as Dr. SCHNEIDER. I am sorry I cannot use the beautiful language and the polished phrases which the Duke of MARLBOROUGH used in welcoming M. DUCHÊNE, but at least I can offer Dr. SCHNEIDER, on behalf of myself and the Council and all of you, a very hearty welcome here, and say how pleased we are, and how good we think it of him to have come all this way to lecture to us.

In case there should be anyone who may not know Dr. SCHNEIDER by reputation, I should like to say he was one of the early pioneers in Yunnan, he made an expedition there in 1913; unfortunately, much of his material, his plants and seeds, were lost owing to the outbreak of war. Since then he has been at the Arnold Arboretum in America, and in Berlin where he is at the present time working on the Berberis family, which, with Cotoneaster, is one of the most difficult families to unravel. He is besides a most distinguished arboriculturist, botanist, and horticulturist, and his reputation is known throughout Europe. He has chosen, I think, a subject which will commend itself to all of us. He is going to talk about the Park of Pruhonice, near Prague, and I think we shall all be glad for a short time to get away from the rut of gardens and gardening designs that we have been wallowing in for the last two or three days downstairs.

I believe this Park at Pruhonice is one of the most beautiful in the world. We have our beautiful parks, of course, in England—I do not refer, of course, to the parks of London, Hyde Park and Regent's Park, they are beautiful in their way—but I was thinking more of the beautiful old parks which are scattered over the length and breadth of England, such as Knole Park, with its beautiful residence; Chillingham Castle, Northumberland, with its fine herd of wild white cattle; Blenheim with its beautiful lakes and magnificent cedars; Powis Castle with the finest oak trees in England; and others. I think sometimes our foreign friends consider these parks rather extravagant and uneconomic, they think it a waste that so much fine grass is given over to trees and bracken and deer. I for one hope that the day may be far distant when taxation, death duties and the cost of living will prevent their owners from carrying on and keeping up these fine old heritages.

We have, too, our own gardens in England here, and I am afraid we are vain enough to think they are the finest in the world. I think if anybody goes downstairs and looks at the historical section of this Exhibition, he will agree with me that these gardens can hardly be surpassed. We have seen many interesting plans and views of gardens downstairs, and I think we all must recognize that the art of gardening has made enormous strides during the last few years. I hope by the time this Conference is over, we shall all have learned something more, at least I think it will be our own fault if we have not.

With regard to the lectures which our foreign friends have been good enough to give us, we had yesterday a most interesting lecture from M. DUCHÊNE, and I must say the designs he showed us on the screen were perfectly amazing—the wonder is that there should be so many rich people in France to be able to make those magnificent gardens. They are not, perhaps, in the taste of England, but one cannot help admiring them and seeing that they are the finest examples of gardening that have appeared in that design since the days of LE NÔTRE. This is not the time or the place to criticize or comment upon M. DUCHÊNE's lecture, but I must say I think some of the smaller gardens which he has designed for residents in Paris are perfectly beautiful. I should like to see our garden architects devote perhaps more time and attention to the smaller gardens of London.

Dr. C. SCHNEIDER: Mr. Chairman, Ladies and Gentlemen,—I esteem it a great honour to have an opportunity to speak to such a distinguished audience about the modern style of park in Central Europe. I wish to explain at once in which sense I apply the word " Park." A park is a product of landscape architecture of naturalistic design, and I am not thinking of the public parks of to-day so widely spread in Germany and Austria. It is the *private* park I wish to speak about. The history of the naturalistic style of landscape design is, I dare say, well known to all of you. It was in England that the park was created by artists like KENT, BROWN, CHAMBERS, and REPTON. During the second half of the eighteenth century this style of landscape architecture found its adherents in Germany. The famous writer HIRSCHFELD preached this new gospel. No less a person than GOETHE took great interest in it. The park laid out under his direction in Weimar is probably well known to a good many of you. GOETHE was inspired by the park at Wörlitz, a creation of Duke FRANZ of Dessau. SCHELL, who had been in England at this time, laid out the large parks at Schwetzingen and the so-called English garden at Munich. But it was another man who may be called the master of the naturalistic style of the first half of the last century: Count PÜCKLER-MUSKAU. He, too, derived his inspirations from England, which he visited several times. There he had the best opportunity to see all the great parks existing at the time, owing to his close connexion with the English aristocracy. In 1815 he began his great work at Muskau on the river Neisse, his large estate near the small town of

Weisswasser on the railroad line from Berlin to Görlitz. Here he built the classic park of the middle of the last century. In 1845 he was, however, compelled to sell his estate at Muskau, having spent too much of his large fortune on his hobby. He went to Branitz, another of his properties not far from the town of Kottbus. Here he laid out another park, by no means inferior to that of Muskau, but in many respects even more interesting than his first work. At Branitz he died in 1872, and has been buried in the tumulus he built for himself in the small lake of his park. Unfortunately, this excellent work of landscape architecture is now in a very bad state of preservation. Muskau, however, now owned by Count ARNIM, a well-known sportsman, has been well kept up, since PÜCKLER left, by excellent curators who perfectly understood the significance and importance of such work of landscape design. The present curator, Mr. LANCHE, takes the greatest care of it.

The art of PÜCKLER as well as that of SCHELL, or of the famous LENNÉ who laid out a large part of the park at Potsdam-Sanssouci, is closely related to the English naturalistic style of this period. PÜCKLER did not use any foreign landscape character nor many foreign plants, especially trees, although many were introduced and well known in his time. He improved the surroundings of his castle by buying up property belonging to the peasantry, and even moved a village to another spot in order to gain room for his park. He enhanced the beauty of the natural scenery by simple but perfect means along the river Neisse, flanked on each side by gently sloping hills.

After PÜCKLER'S death there was quite a stagnation in the German art of naturalistic landscape design. A certain mannerism taught especially by GUSTAV MEYER, the superintendent of the public parks at Berlin, spread everywhere.

In the eighties, however, another grandseigneur like PÜCKLER, a self-taught man too, appeared on the scene. It is Count ERNST SILVA TAROUCA, and of his work, of his large park at Pruhonice near Prague, in Bohemia, I wish to speak to you. But before I show you the park I will say a few words about some principles by which his art is ruled. I have been closely connected with him for over twenty years. I deeply regret, however, that I cannot express myself as clearly in English as I could in German. It is always difficult to say such things in a foreign tongue.

In my opinion, the main point is that Count SILVA considers it necessary and opportune that a landscape artist avails himself of *all the foreign plant material* as far as it is fit for our climate and for the special task he has set himself. He believes that the modern designer of a park ought not to restrict himself to the native plant as was done by most of the great landscape artists at the beginning of the naturalistic style. This may not seem important at first sight, but it means a good deal with regard to the natural and æsthetic character of the park.

Nevertheless it is true that foreign trees and shrubs were used in great number in older parks. But these parks were seldom more than pseudo-naturalistic plantations without a true artistic conception. It is the personality of the artist that creates a park, not the mere planter or dendrologist. A plantation, from a dendrological standpoint, can never pass for a park. Only a born landscape architect is capable of landscape composition. Like the landscape painter, he ought to arrange the elements of his design into an ordered *ensemble*. But while the painter is chiefly concerned with the two-dimensional relations of his elements as seen from one point of view, the landscape architect is making a composition in solid objects in the outdoor world which will be seen from many points of view. A park shows to us a series of pictures. It is, as Sir UVEDALE PRICE expresses himself, indeed only through obtaining a series of two-dimensional views that an observer can perceive or value the three-dimensional composition. But the landscape architect must show us more than mere pictures, more than a series of interesting sceneries. He is no painter but an architect, hence his name "landscape architect." He really erects a building, not of dead material, however, but of living plants. To be able to do this the landscape architect ought to know his material as a true gardener does, otherwise he might use the wrong material or the right one in a wrong way. The plants may not grow and might not show the characters he wanted. But the man who wants to lay out a park must be, I repeat, a born landscape artist. And this is the case with Count SILVA. He is an enthusiastic sportsman, and on his numberless hunting trips he became well acquainted with natural scenery, and with the trees and flowers of Central Europe. Nature's striking examples served him as inspiration. He is, I repeat, a self-taught man. He bought his great estate in 1886. Two years later he commenced his work without any knowledge of the great English parks; he has never been in England. And at this time he had not yet seen even the famous park of Prince PÜCKLER, nor had he had an opportunity to study the parks of SCHELL or LENNÉ. He knew, of course, PÜCKLER's small booklet "Andeutungen über Landschaftsgärtnerei," but I myself it was who went with him first to Muskau in 1922. All this we must keep in mind to appreciate what Count SILVA has done at Pruhonice.

He is a grand seigneur, a fine representative of the old Austrian high aristocracy. I have seldom met a more sympathetic personality among persons of rank. His ancestors came from Spain, hence his name. One of them had been Spanish Ambassador to the court of Vienna in the seventeenth century. His descendants remained in Austria, and married daughters of the German high aristocracy, becoming big landowners in Bohemia and Moravia. The family is now entirely German. The Count is sixty-eight years of age, but still very healthy and indefatigably working in his immense park of over 500 acres. I had the good fortune to become acquainted with him in 1908, when together we founded the once well-known Dendrological Society of Austria and Hungary at Vienna, with an experimental garden at Pruhonice.

Now I will say a few words about the park itself.

Nobody who goes by train or car from Prague to Pruhonice expects to find there a landscape of great natural beauty. The country is rather flat and covered with wide, well-kept fields, indicating a rich, heavy soil, an ideal place for farming. Even after his arrival at the little village of Pruhonice, the traveller sees almost no sign of a large park. But as soon as he steps into the courtyard on the southern side of the castle, a great surprise awaits him. The first of a sequence of grand landscape scenes opens upon him.

The whole park at Pruhonice forms a series of valleys surrounded by woody slopes with wide green lawns. Several ponds of different sizes are connected by a small rivulet. These ponds form each of itself a natural scene of distinct character. Count SILVA was fortunate to find on his grounds everything he needed to develop and create landscape effects in a grand manner. He carefully studied the natural character of each scene in order to treat each in its turn and to develop each important view as a pictorial composition.

The formation of certain landscape scenes by means of trees from parts of the northern temperate zone other than Europe is not infrequently met with in our parks. Rarely, however, it is attempted on such a large scale, and, as I may say at once, with such great artistic skill. The variation of the natural scenes at Pruhonice is one of the great features of the park. Some of them may already be regarded as finished. We perceive even now their final characteristics. The trees are large, and the other plantations sufficiently developed. But these sceneries are not the most remarkable ones. The artist created entirely new landscape features. He partly changed the whole character of the existing landscape, partly he developed a new type of landscape by planting formerly empty spots with foreign trees and shrubs. Most of these plantings are still too young to show the real effect the artist had in mind.

One scene especially seems to me very promising. A very large, deep pond, almost a small lake, is surrounded by rather steep slopes. Those facing south form an imposing natural rock garden, quite different from the one near the castle, of which I shall speak later. The schistose rocks are rather barren, and it proved almost impossible to start plant growth on them. Nevertheless, there you will see groups of Blue Spruces (*Picea pungens*), Blue Firs (*Abies concolor*), and black-green Austrian Pines slowly growing up, while in the rich bottom land on the shores of the pond, Douglas Firs, Engelmann`Spruces, and other North American and Asiatic Conifers thrive luxuriantly, together with American Red Oaks and other foreign trees with fine coloured foliage.

The same is the case with the Conifers planted on the slopes facing north.

The purpose of the landscape architect is to create the impression of a high mountain lake surrounded by steep slopes partly covered by tall, grave Conifers, partly by gay sun-loving trees and herbaceous perennials. This place at Pruhonice is called the Boržin. I saw the young plantations first twenty years ago, and on every new visit to Pruhonice I am surprised how quickly those Firs, Spruces, Pines, Arbor-vitae, Cypresses and the deciduous trees, are growing. The Boržin is, I think, Count SILVA's greatest piece of landscape creation; I only wish that he may live for many years in order to bring this grand conception of his to proper perfection. Nobody else but he himself can do it in the proper way. From year to year he has to improve his composition, to take out with the axe hundreds of trees, making room for those that are to remain. He does not want to have a wood, he wants a park with most of the trees well developed and branched from base to top.

Formerly the main feature of the park was the large, picturesque natural rock garden stretching for half a mile along the eastern side of the pond beneath the castle, and it once comprised the richest collection of alpine plants on the Continent. Unfortunately, since the war most of the finest plants have been lost. During the war Count SILVA was absent from his estate for years, and after the war he had no means at his command to keep up the rock garden as he used to. It was once his main hobby, and he could be really proud of it! He is a great collector of plants, but as an artist he knows well that the love for certain plants may be fatal to the whole artistic composition, of which the entire effect is only too often spoiled by unsuitable details. Every scene has to be regarded as one composition of homogeneous character. Every landscape architect, especially the creator of naturalistic sceneries, must keep this in mind, otherwise his composition attains a ludicrous and petty effect.

But back to the rock garden. Only the hardiest plants survived; it is, however, really astonishing how many plants have become almost naturalized. It would carry too far if I went into details which, from the artist's point of view, are unimportant. For this reason I only mention another feature of the park—a great plantation, under Pine trees, of many evergreen shrubs. It is a real evergreen fruticetum of great dendrological interest. Here we find many of the new shrubs introduced from China by WILSON, FORREST, and other well-known travellers. It is very interesting to observe how many of these shrubs do well and seem to be quite hardy. It is, however, a well-sheltered place, although the climate of Pruhonice is by no means mild.

Formerly large stretches of the park consisted of Pine trees. The Count carefully made his new plantations before felling these old Pines. He is removing them according to the growth of the newly planted trees. It is astonishing to observe how suddenly new scenes with Beeches, Maples, Oaks, and other trees make their appearance, and how skilfully the young plantations have been laid out without any drawing or any fixed plan. The artist carries his plan in his head. He is not in a hurry to finish his work. He spends his whole lifetime in building up the natural scenes he wishes to create according to the possibilities of the locality. A park like that at Pruhonice can hardly be laid out by a professional landscape architect.

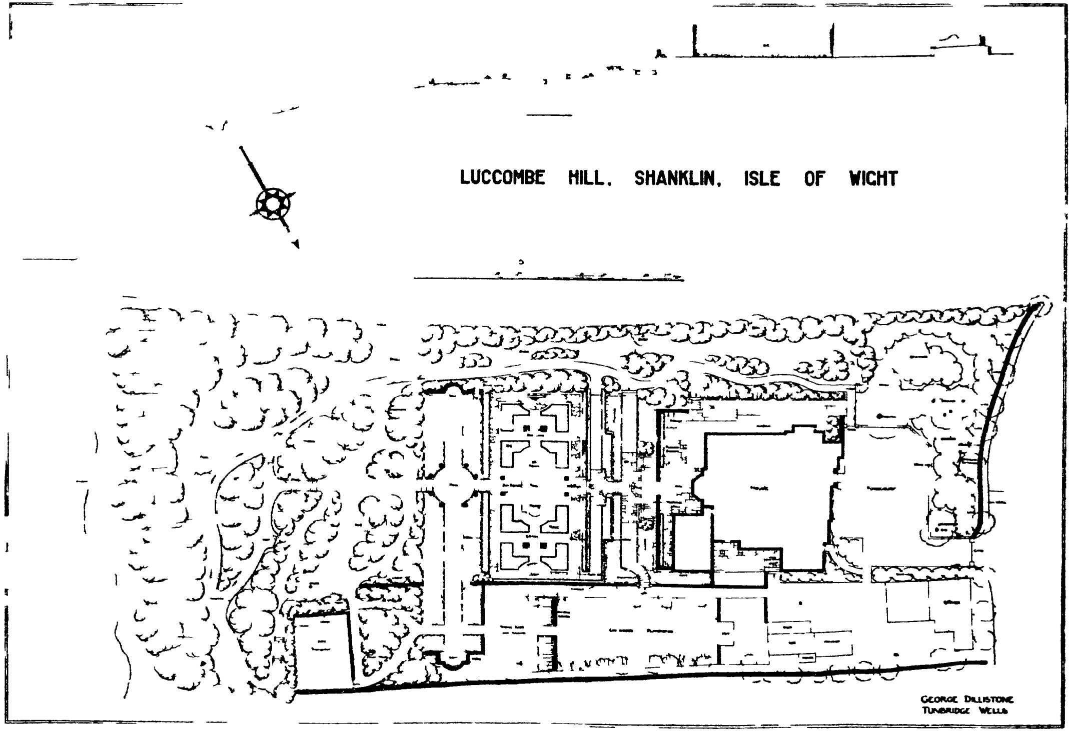


FIG 109—A GARDEN PLAN

(See p 311)

[*To face p* 304

Fig. 110.—The Rose Garden at Luccombe Hill

Fig. III.—Herbaceous Borders at Luccombe Hill
(p. 313)

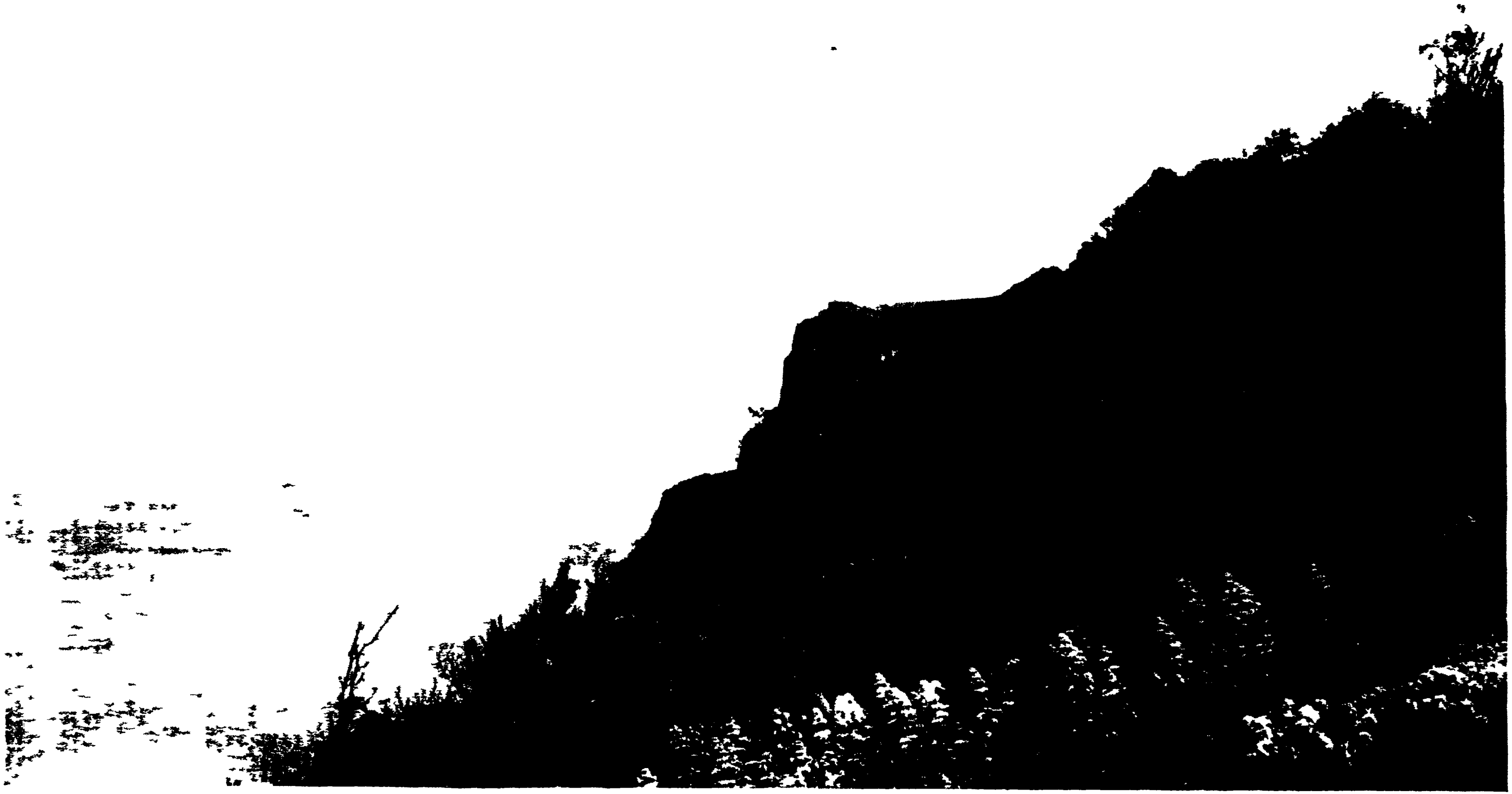


Fig 11.—The Cliff Luccombe Hill

This is what every intelligent visitor feels when he is walking through the park with Count SILVA. The critic may disagree with him about one detail or the other; he will nevertheless acknowledge the mastership of the landscape architect, the personality of a typical artist.

The park at Pruhonice is, I believe, our largest modern park, and I do not think that there is, even in Great Britain, a modern creation of landscape design of higher artistic value. The park needs, of course, another twenty to thirty years more to develop fully its most important characteristic scenes. It is therefore a very good thing that the Czecho-Slovak Government has taken over the park as a national park, and provides a good deal of money for its upkeep and finish. Count SILVA and the Government at Prague have come to an agreement. The Count remains at Pruhonice until his death, and has every opportunity to finish his work. The Czecho-Slovakians are a garden-loving people. and they will try to preserve such a great living work of landscape art, and surely those works are among the most precious possessions a country can have.

VIII. THE SMALL ENGLISH GARDEN.

By MR. GEORGE DILLISTONE.

Chairman: Sir OSCAR WARBURG, O.B.E.

THE CHAIRMAN: Ladies and Gentlemen—It may not be clear to you, and it was not clear to me, why I, a mere administrator, and a humble member of the London County Council, should have been asked to come in to this great galaxy of gardening stars to-day in order to preside at Mr. DILLISTONE's lecture. It is perhaps accounted for by SHELLEY's poem, in which he addressed the Moon, and said:

> "Art thou pale for weariness
> Of climbing Heaven and gazing on the Earth,
> Wandering companionless
> Amongst the stars that have a different birth."

I feel that an administrator whose only claim to gardening fame is the possession of what is, I think, without dispute the untidiest garden in England, has no real right to be here, but perhaps that very fact accounts for my presence. It may be of course that people appreciate that, though in a multitude of counsellors there is wisdom, in a multitude of experts there is sometimes a lack of unanimity. We had an example of that the other night, at the very nice dinner which was given in connexion with this Exhibition, when Lord CRAWFORD, who is responsible, as guardian of the public taste in London, for telling us exactly what we ought to like and what we ought to dislike, enunciated certain views as to garden planning. He said that the important thing in selecting material, was to select native material, material appropriate to the locality in which the garden was situated, and I am thinking of asking him to come up to my garden in the Surrey hills and tell me how to make use of the flints which are my native stone. Mr. DILLISTONE will, in his discourse on "Small Gardens," explain to us the native stone of London, which is, I believe, the brickbat, and tell us how this can best be used in the small gardens of the Metropolis, and when he has finished with that, perhaps he will go to Snowdon and tell us how to beautify the wonderful ravine on the top, which consists of an accumulation of tins from the hotel.

But I will not stand between you and the lecturer. In past days it was said of poets, that:

> "Three poets, in three distant ages born,
> Greece, Italy, and England did adorn.
> The first in loftiness of thought surpassed,
> The next in majesty, in both the last:

and I feel that though we are self-depreciative in England, it may perhaps come about that in the future it will be appreciated that, though perhaps the great French gardeners of the past, and the Dutch, laid the foundations of garden planning, it will be in England that that great art is finally worked out and a solution found which combines both grace and dignity of thought.

Mr. G. Dillistone : The lecture I am about to give you is not the one I really intended to give. Last week, the state of my health was such that it appeared to be impossible for me to come here at all, and the Secretary suggested that I might let him have a manuscript and some slides, and he would arrange for someone to read the paper. Not knowing what was going to happen, I wrote the manuscript, so I shall read it. I hope it will meet with the approval of most of you, and above all, that it will deal with the points that you desire touched upon. If there is time at the end, and anyone would like to make any inquiries, or dispute any points I make, I shall not mind in the least ; indeed I shall be only too pleased.

In a few moments the lights will have to go down for the projection of lantern slides. Before that time arrives, I should like to make a few remarks on the general aspects of the subject.

In a country like England, where it is the ambition of every cottager to have his garden patch, and where no mansion can be considered complete without a garden, it is a little difficult to draw the line between what constitutes the small and the large garden. To a great extent it is a matter of personal outlook. The small garden of one man may be an entirely unrealizable desire on the part of another.

I have therefore selected an area that would be a compromise between the amenities of the mansion and the few square yards that may, in name, form the garden of a cottage, and that will exemplify the great middle class that represents popularity in gardening to-day. I think I shall be quite safe if I take this as being fairly represented by an area that may not be less than one acre, but might conceivably extend to, say, three or three and a half acres. In choosing the illustrations that I am using I have therefore confined myself to garden pictures that have actually been produced within these areas.

It may sound a bold statement to make, but I think it is a safe one, that nothing in the history of the world comparable to the smaller English garden of to-day, as it actually exists within such areas as I have just mentioned, has ever occurred before. There are various reasons for such a statement. First, perhaps, there is the fact that the earlier civilizations of the world (and hence the gardens of the world, for no nation has turned to gardening until it has reached its highest state of civilization) have all been developed under climatic conditions so distinct from our own, that what is possible in England has never been practicable in earlier history. Second, there is the fact that although Rome, Greece, Egypt, Persia, and all the earlier dominating nations of the earth, travelled, colonized, and collected the vegetation from the countries they had overcome, in every case the area over which they travelled was circumscribed. Even Rome (or for that matter all Italy), at its highest state of civilization and development, had a comparatively limited area upon which to draw. The whole of the vast continent of America was a sealed book; the vegetation of China and Japan was practically unknown, and the material collected in these two countries alone has gone a very long way towards making the English garden, small or large, the wonderful thing it is to-day. But there is another factor, and not the least important one: even if these nations could have had at their command considerable areas upon which to draw, they had not the same means of transport that we have to-day. Progress was painfully slow, and it would have been impracticable to convey many of the things that make the English garden most beautiful, over the long distance necessary, with any hope of them reaching their destination alive.

Again, at no earlier period has there existed the means of communication and the means of disseminating knowledge quickly and generally, and therefore although beautiful plants might exist in one part of the world that could have been transported to another, the fact that they were there, or of any value if so transported, was never recognized.

Taking all these conditions into consideration, it is not surprising that even the most modest English garden of to-day is in fact a unique development in the history of the world. The material at our disposal gives us such vast resources that it has exercised a very definite influence even on the design of the modern garden.

I feel that at this point there may be amongst my audience a slight divergence of opinion regarding such a remark. I shall probably be told that the principles of design remain the same, no matter how or with what the garden may be planted. I am sorry, but I cannot agree with this point of view, for various reasons. The first is that above all things the garden is the place in which to grow those plants, trees or shrubs that we love and want to grow, and if the garden is to be successful the fullest possible regard must be paid to the requirements of such vegetation. In preparing the design for a garden it is imperative to realize, first, what the soil will grow; secondly, what the owner of the garden wishes to enjoy in it.

Let me mention one or two examples. It may be that one owner is very keen on the cultivation of the natural order Ericacae, embracing all the Rhododendrons, Azaleas, Andromedas, Ericas, and a host of other beautiful shrubs. The cultivation of this type of material makes it imperative to provide a design and general arrangement quite distinct from that required for, say, the cultivation of roses, sub-tropical plants, alpines, rock plants, etc. I do not wish to labour this point, but I should like to emphasize one fact, and it is this—that where the area is limited and the owner's taste is very definite regarding the material to be grown in the garden, one is restricted in the development of a design. You cannot crowd everything one would wish into the small garden, and desirable as diversity of treatment may be, it is not practicable to create that diversity when the

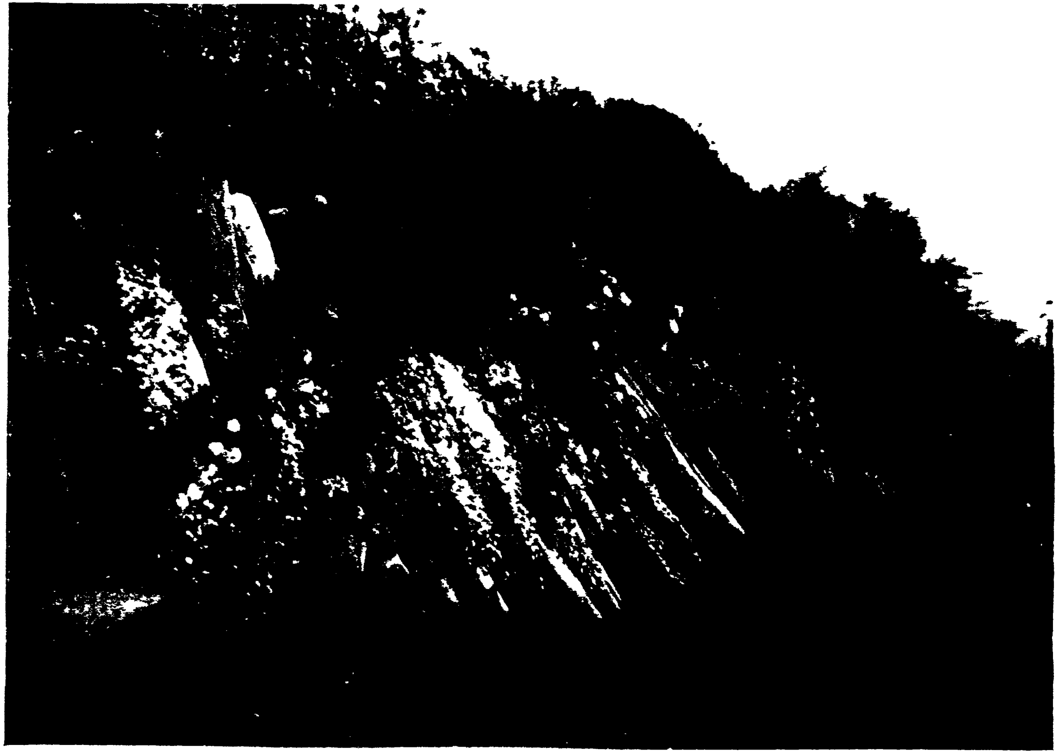


FIG 113 —THE WOOD PILED CLIFF LUCCOMBE HILL

(p 314)

[*To face p* 308

FIG. 115—THE BORDERS AND OLD FARM BUILDINGS.

(p. 314)

Fig. 116.—A Shadow-chequered Path.

(p. 314)

Fig. 117.—Rose Garden and Dry Wall

(p. 314)

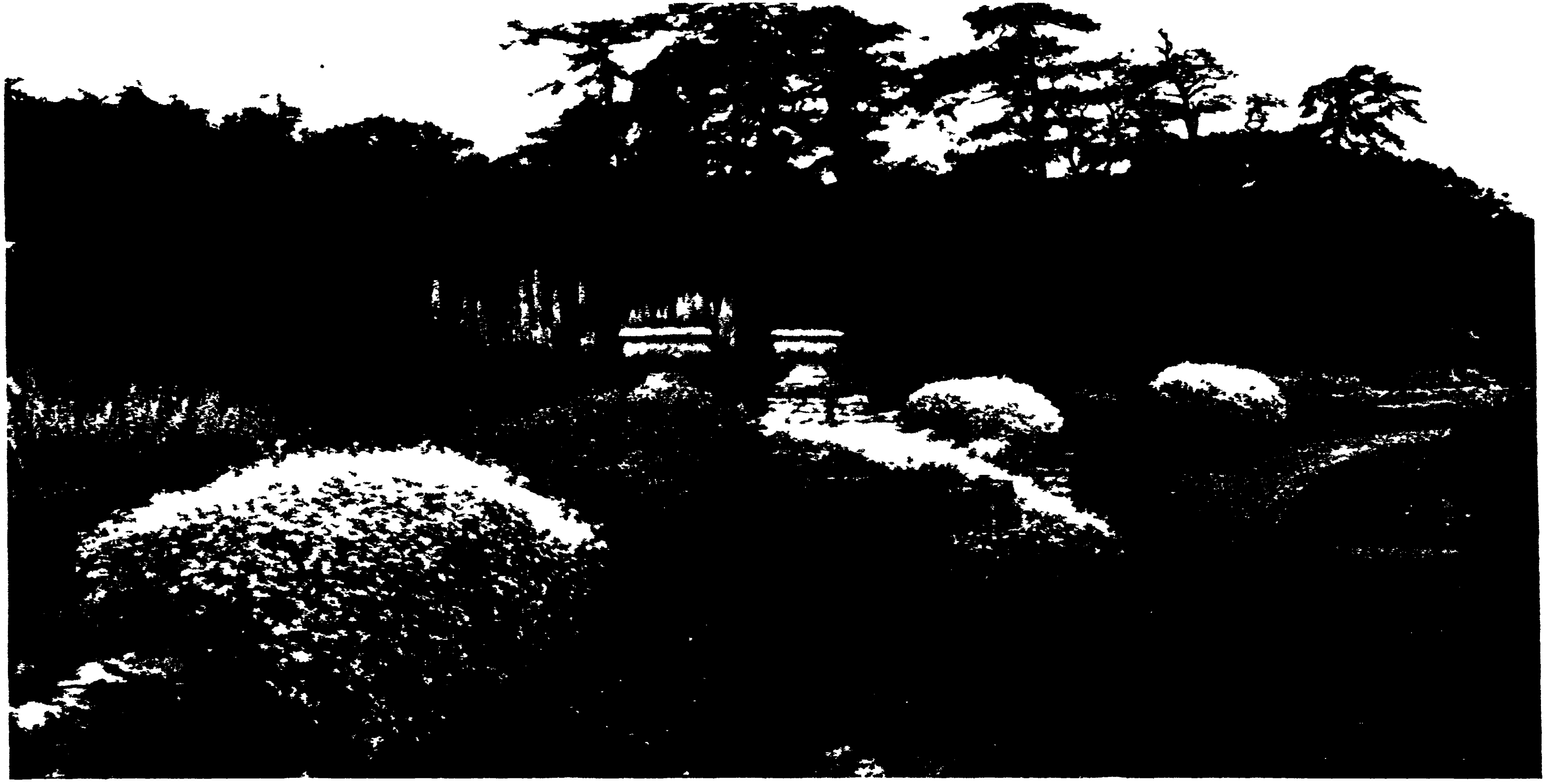


Fig. 118.—Rock Wall and Flower Beds

(p. 314)

Fig. 119. A Rock Garden

(p. 314)

Fig. 120.—A Cascade.
(p. 315)

[To face p. 309

subjects that are to be grown demand, by their very nature, considerable space. In the large garden these circumstances do not arise, but in the smaller the material emphatically controls, and to some extent creates, the design.

I think I have said enough to convince you that the garden design that is prepared without consideration of its ultimate planting can never be quite successful.

Now I would like to take the opposite view for a moment. There are circumstances in which it would be folly to subordinate every consideration of design to the personal desires of the owner of the garden, so far as inclination regarding choice of planting is concerned. One may have a very keen appreciation of the class of vegetation I have just mentioned, that is, the natural order Ericacae, and yet be doomed to live in a house standing on soil strongly impregnated with lime. In such circumstances the cultivation of Ericacae involves enormous expense, out of all proportion to the results that can be obtained. The contours of the site itself may be such that they offer an insistent demand for a garden design that is not suitable for the cultivation of such vegetation. Undoubtedly the best method by which to arrive at the most successful design is to take the site itself and all its elements, local circumstances, the nature of the soil, and even the very type of house that is being or has been built on the site into consideration, and, from a full appreciation of all and every circumstance, make such a garden and grow such material as will prove to be the most successful.

Nothing that I have said in any way alters the fact that every garden design, and more particularly that of a small garden, should be developed on certain lines that we might almost describe as principles, nor for any type of development is it necessary to depart from such principles. May I just state briefly what I consider these principles to be :

1. The garden must bear a definite relation to the house that it surrounds. By this I mean that every window should have its garden picture and that each door should lead naturally to some garden attraction.

2. The design must not be over-elaborate for its size. By this I mean that one cannot crowd into a limited area a great diversity of treatment, or, in other words, that very often the simplest lines will be the most effective.

3. In the preparation of such a design it is essential to remember that the garden is for enjoyment, not for one month, but for twelve months in the year, and that, as far as is practicable, arrangement should be made for a successive rotation of flower or foliage and thus avoid monotony.

4. Mere patterns in paths or the geometrical division of areas into plots does not in itself constitute a garden design. Such things are necessary and no garden can be made without them. Moreover, there are definite principles for linking up house and garden by lines

that lead to and from the important points of the residence, but they are really subordinate features in a general conception. The question whether a path should be straight or curved, whether it should lead at right angles or parallel to the residence is hardly worth discussing, as circumstances themselves will control this; the great thing is to use the straight path and the geometrical design in the position for which it is suited, but to curve one's paths across a slope to provide an easy gradient if and where necessary.

I believe and hope we have left behind us the old (and sometimes acrimonious) discussions as to whether the formal or informal types of gardening are best. It is absurd and indeed almost inconceivable that this miniature war should have been waged so bitterly. There is no question whatever of what is best when we apply the argument to the small English garden; both will inevitably find their place, and either is best in that place. If the garden is conceived in the spirit of true art, these things settle themselves. Is it not obvious that if you force a formal design into a little bit of natural woodland, you make trouble for yourself when you come to link up its boundaries? Is it not equally obvious that with a broad, open area and rapidly falling ground, almost treeless, one must terrace and level; one must adhere to geometrical outline, and that within such outlines the pattern must conform to its frame? In other words, it must be what is usually understood as a formal garden. But flowering and foliage shrubs planted in formal beds are rarely satisfactory, and bedding roses and certain herbaceous plants never look happy in scattered masses of irregular outline.

The question of what is best in garden design is therefore to a great extent one of environment. There is a simple and compelling dignity about a symmetrical and well-proportioned geometrical design properly applied, and planted with suitable subjects, that appeals very strongly to our sense of what is fit and beautiful, provided always that it is used in the right place. Throughout all the civilized ages symmetry has been regarded as an essential of beauty in all things that man designs. Poise, balance, symmetry, and proportion have been the elemental inspiration of all art throughout the ages. Even where the design has departed from true geometrical development the one half is the complement of the other.

I wanted to avoid the term "Natural," but it will creep in because it really does convey an impression that is understandable. But the term is often misapplied and vested with a meaning that it can never possess in gardening. There can be no such thing as a "natural" garden in the true sense of the word. You may copy, idealize, interpret, or even organize Nature if you will, but your effort will be of man—man's handiwork and endeavour, and therefore appertaining to art rather than nature. The term "Informal" but faintly expresses the same thing, and it is good to think that all these terms are becoming obsolete.

Without discussing the respective merits of whatever these terms convey to you, all I wish to do is to emphasize the fact that design is not necessarily confined to the more formal, or shall I say architectural portions of the garden. The woodland walk winding through drifts of Anemone apennina, Muscari, Narcissi, Scillas, or shade-loving shrubs, is just as much a matter of design as the geometrically devised rose garden, formal water garden, or any other garden development, where symmetry, balance, and conventional form take the place of the more erratic natural line. *The whole essence of successful design lies in the arrangement of the materials at our command,* be they plants, shrubs, trees, or bulbous plants, *so that they shall form, not only individual pictures, but a pleasing composition.*

Garden design cannot confine itself to the immediate precincts of the house, but extends itself to the farthest limits of the landscape, wherever this is practicable. It takes into account contours, form and colour, creates a pleasing order in the flower gardens near the house, and focuses the distant views by the studied disposition of trees within the boundaries of the garden.

It studies the local soil and climatic conditions and selects such material as will prove successful within local limitations. Where practicable it may also on occasion so alter those conditions that the natural vegetation of the locality may be enriched, as, for instance, by the introduction of lime or peat into such staples as are deficient in them, or by the creation of sheltering belts of trees and shrubs, so that the natural exposure of the locality is overcome, and vegetation cultivated within such shelter may be of a less hardy nature than would otherwise be possible. The placing of a single tree or group of trees on the extreme boundary of the garden involves a regard of the principles of design, just as much as the construction of the most luxurious development of a garden conceived in what is known as the Italian spirit; and whether your garden be of one or many acres matters not at all.

Now we will pass on to a few illustrations, and the first is a garden plan (fig. 109) that embodies most of the requirements of garden design in an area of a little over one acre. I must say frankly that in ninety-nine cases out of the hundred I should consider this design was rather overcrowded. In this instance, however, so many conditions and circumstances had to be considered that intensive development was imperative. Here is a house standing some 200 feet from the edge of a cliff, falling to the English Channel, in a sheltered, sunny spot on the Isle of Wight. Rather exposed to the south-east winds, it is sheltered from every other. Every gleam of sunshine reaches it. The soil is lime-free, therefore capable of growing anything the owner desires, for you can always add lime but you cannot take it away. The section shows by the dotted line the original slope from the house to the cliff edge. The site is bounded by other gardens, so that at no point was there anything objectionable to screen. The owner is so keen a gardener that anything an English garden is capable of producing appeals to him. The only thing to be considered was to take advantage of every inch of the site and make the best possible use of it. The method adopted is so illustrative of general principles that I will mention them.

1. It was obviously necessary to introduce an area immediately in association with the house from which the panorama of garden and seascape could be enjoyed at any time of the day. Hence the terrace, with its broad two-way steps descending to the lower level.
2. The second necessity was to create a line of vision that would be definitely directed towards the principal objective—in this case, the sea view. That this line (A.A. on plan) happened to coincide with the main window and door from the house was one of those happy accidents that sometimes assist the gardener. When the architect and gardener work in sympathy and collaboration such achievements are the rule.
3. On ground falling as in this case it was easy to take advantage of cross-axes and introduce the advantage of transverse views as one descends from point to point.
4. The quite explicable desire for certain level areas rendered it necessary to merge banks and slopes pleasantly into the surroundings with no sense of abruptness. Moreover, the descent being somewhat too steep to be pleasant, slight curvature of the outer paths became imperative.
5. In view of the limitation of area it was imperative to pay more than usual regard to matters of proportion. Retaining walls that are too high for the levelled area they retain are objectionable in the extreme. Long flights of steps leading to a narrow platform of a garden impose an indefinite, but nevertheless real, sense of irritation.
6. It was possible to provide a sufficiency of levelled areas to carry the lines of the house outwards without imposing any sense of extreme artificiality. On these areas all that may be termed formal gardening is introduced.
7. Finally, it seemed a pity that such a sun-trap as the cliff itself should be lost to garden purposes, and by undertaking a certain amount of excavation it was found practicable to provide areas both dry and damp for the cultivation of many plants that were necessarily excluded from the garden above. Had nothing else been achieved, the facilities thus provided for the cultivation of a large collection of Mesembryanthemums under satisfying conditions would have justified the operation. They are there tumbling in wild masses over the ledges, some forty or fifty species, carpeting the slopes, and for nearly six months of the year always in flower.

Briefly, the design consists of forming an upper Terrace, a second terrace walk that was necessary for the purpose of meeting the levels at each end, a third and broader level for the design of a Rose Garden with central Lily Pool, and yet a lower level where herbaceous borders traverse the greatest obtainable width of the site and flank a broad grass walk. On each level the water supply has been utilized in

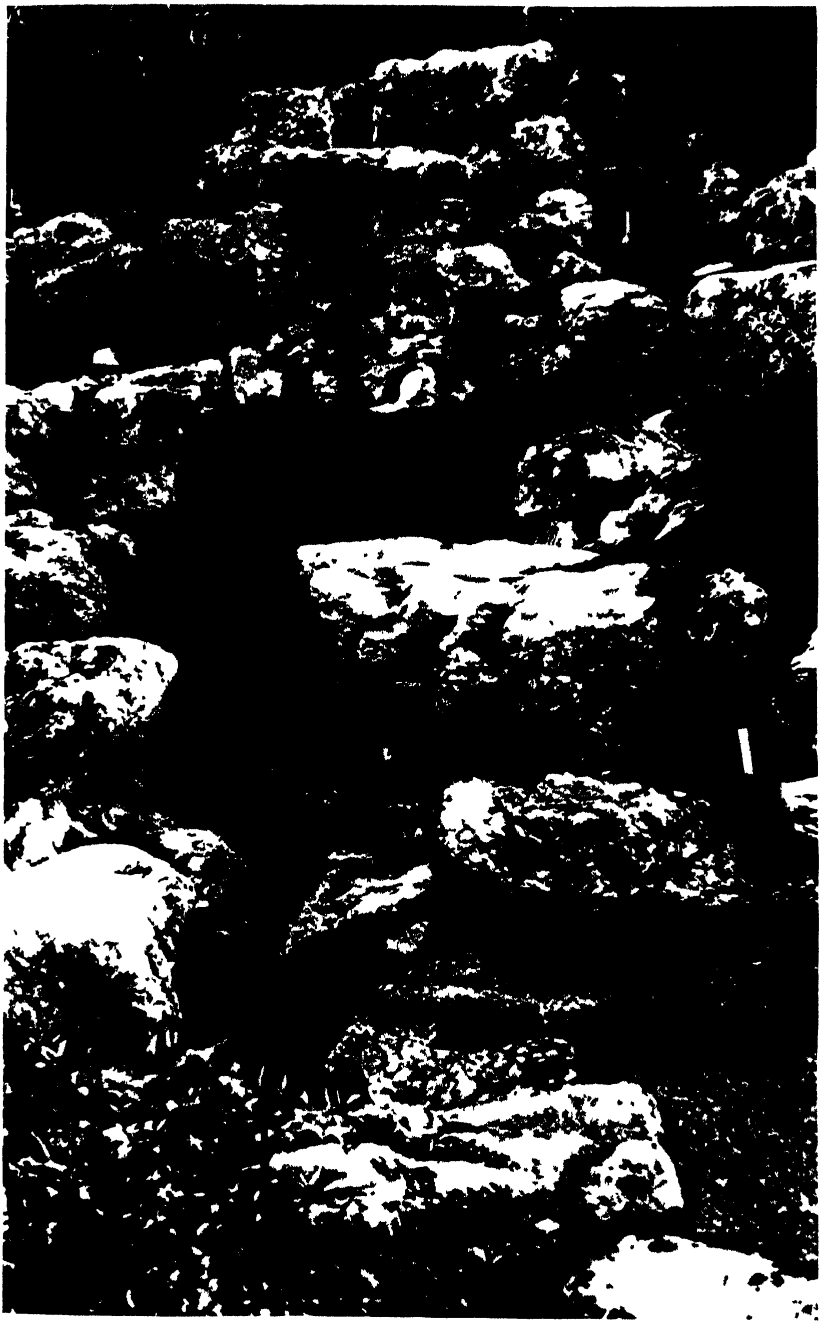


Fig 121 —Westmorland Limestone
(p 315)

[To face p 312

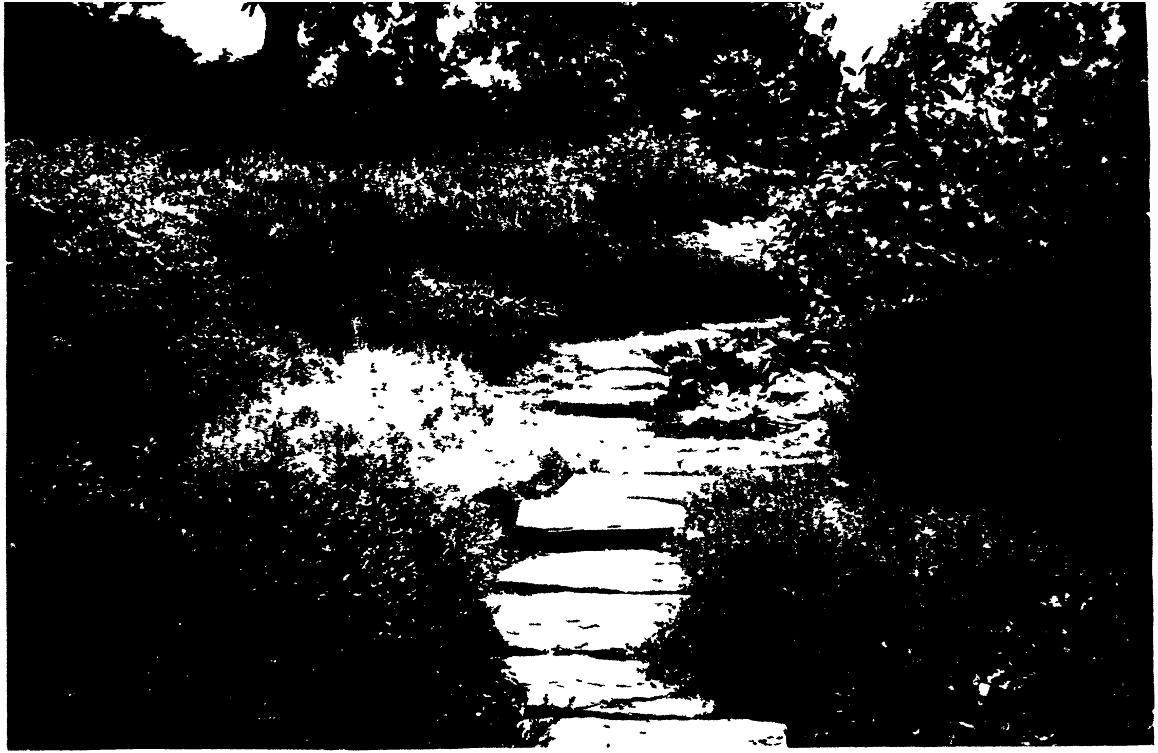


FIG 122 —A WILD GARDEN CORNER

(p 315)

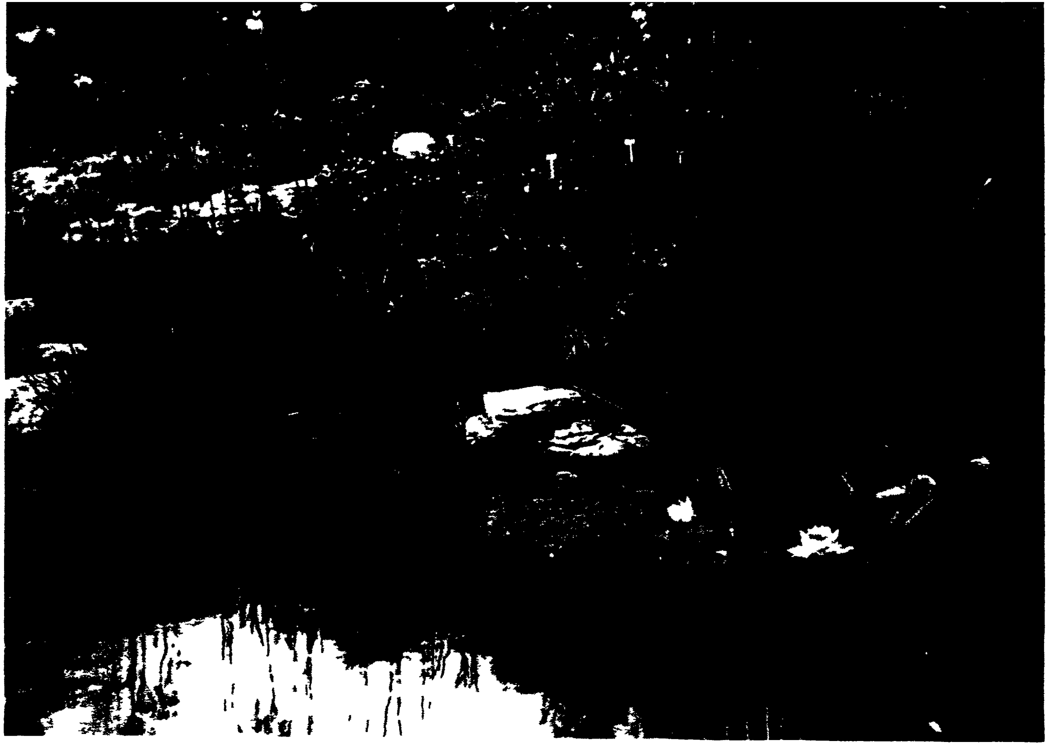


FIG. 123.—A CONCRETED STREAM

(p. 315)

[*To face p.* 313

successive pools and thus by continual passage of a very economical supply, the water is kept sweet and clean. The overflows are thus all collected in the little circular pool and thence evacuated to the cliff drain, the water being finally intercepted to keep moist a place in the cliff garden, where Rodgersias, Astilbes, Spiraeas, moisture-loving Irises, etc., thrive.

The incidents that occur throughout the garden can best be illustrated by a few photographs taken therein, and these we will now proceed to show you. Before doing so I must touch on one important point—the absence of any provision for the cultivation of vegetables. Few people with a garden of this size would be content to give up entirely such a useful complement, but in this case we were relieved of the necessity of even considering it, as there was no position in which they could have been grown successfully without sacrificing the whole site.

Now I should like to take you for a rapid walk through this little garden. Time will not permit us to pause and discuss all the wonderful things that grow in it, much as I should like to emphasize the fact that design in planting is as important as design in line.

First, we pass down the steps from the Terrace, cross the second terrace walk, and arrive at the Rose Garden (fig. 110). This consists of an arrangement of rose beds surrounding a Lily Pool. I want just to mention the reason for adopting the particular design used in this pool. It was imperative to keep the centre low so that the eye could travel on uninterruptedly down the main vista. At the same time, it was desirable to give a sense of enclosure to this vista, and the raising of the coping some sixteen inches at each end just achieves this. Moreover, the flatly coped walls at the ends make just that sort of place that one likes to sit down on for a moment when there are things of interest all around. The casual introduction of the dovecote in the corner is one of those things that happen sometimes, without forethought, but which often add that pleasant note of homeliness that makes the garden enjoyable. Next we descend a flight of steps, and to right and left is a broad grass walk, each side of which has herbaceous borders arranged for the longest possible flowering period consistent with pleasing colour arrangement (fig. 111). If we turn for a moment at this point and look back up the steps towards the house, we see that at each descent we have very slightly widened the steps in relation to the next flight above. This is always a sound policy. Steps that grow narrower as they descend lose immeasurably in attractiveness. Further, by spreading the distances between each flight, and arranging the levels carefully, we avoid the hump-backed appearance that so many continuous flights of steps present. The view travels easily down the whole series. We pass through a screen belt of shrubs, placed to give protection against the worst of the south-east winds, and on through various interesting plantings of a semi-wild nature, and arrive at the cliff view (fig. 112). I should like to tell you a lot about this view, but we must hasten on, and with a picture of one little bit of the cliff garden we must finish our walk (fig. 113). I must leave to your imagination the colour effects that this little corner presents throughout the year, for it is never entirely colourless, and its rusticity is so far removed from all that is of a formal or architectural nature that it never jars. It looks just the right thing in the right place and therefore appeals to one's sense of fitness. Stone was impossible for various reasons, not the least being the difficulty of supporting its weight without a feat of engineering. The wood piling just achieves what is necessary in the simplest way, and it adds a variety of tone. An occasional rotting pile is easily replaced.

Now we will visit another little garden of a distinctly different type. It was planted on the site of an old farmyard, and the picture (fig. 114) is of one of those elemental necessities in any garden, sunshine and open lawn. There are incidents round this lawn, and crossing it from the steps we turn and get a glimpse of the old farm buildings set in a frame of flowers, and a few steps farther on we get a second picture of the same nature (fig. 115). This brings us to a shadow-chequered walk (fig. 116) leading to what was once a farm building but is now converted to garden uses, and at a turn in the path we get a glimpse of the house beyond a flowery foreground.

Now we will pay a short visit to a garden that has always, since I first saw the bare three-acre paddock in which it was developed, been very near my heart. Its late owner, an honoured memory to many members of this Society, was one of the keenest gardeners of his day. This garden, as regards size well within the bounds of area of which I am treating, presents so many points of interest that it is difficult to hurry through it. Entered through an arch in the wall, the reverse of the scene presented to you bursts on the view (fig. 117). On the left lies a Rose Garden, sunk 18 inches below the general level and to which the circular steps lead. Incidentally, the earth removed from the sinking served the useful purpose of creating the elevation of the Rock Garden that you will see in a moment. The Rock Garden lies behind the border on the left and is seen from nowhere but at the point of entrance to it, and within its own confines. Therefore it does not intrude itself and spoil other pictures by introducing a sense of restlessness as a Rock Garden can do. The steps leading outwards from the Rose Garden on the opposite side form our next little scene (fig. 118). The paths in this case were formed of little Dutch bricks, 7 inches by 1¾ inch. Fig. 119 shows a general view of the Rock Garden from the point of entrance, and finally a little corner of it.

This brings us to the subject of Rock Gardens in the small garden generally. Whilst everyone will concede that the English garden would be incomplete without its roses, it is not so certain that rocks are imperative. To be quite frank you may have, as nearly as is humanly possible, the perfect garden *without* a rock; you may render your garden far from perfect by forcing a Rock Garden into an undesirable situation. The soundest advice I can give is not to *look* for a place to put the Rock Garden, but if the place is there it will suggest itself, and then it will be the right place, and the Rock Garden, if properly constructed and planted, will be right also. Let us look at one or two examples of small Rock Gardens and leave them to point their own lessons. Fig. 120 shows Sussex sandstone, used to retain a ledge and conduct the water of a spring to a pond below.

The next figure (121) illustrates a rock garden built of the grey Westmorland rock. It was photographed only six months after completion, so has yet to mature.

Two little pictures (figs. 126, 127) illustrate the connexion between house and garden. The first is looking back towards the garden door. The next, the view obtained from that door on emerging.

There is one feature of the modern garden of which full opportunity is rarely taken. The odd corners that appear to be impossible for anything, can often by simple treatment be converted into pleasing little wild gardens: miniature moorlands if you like, somewhat on the lines shown in fig. 122.

And even a concreted stream can by carefully designed planting (fig. 123) be rendered natural in appearance.

* * *

In concluding these remarks I feel that some apology is necessary. In sheer despair of being able to encompass such a subject within the time at our disposal, I am conscious of having merely skirted its fringe, and never got to its heart. I have not *dared* to examine details of design. The mere allotment of space in designing the small garden would have involved so much reasoning out that it had to be omitted. Twenty such talks would still leave much to be said. Nor have I tried to make a "gracious pattern out of words," and my illustrations have been selected rather for their extreme simplicity than to demonstrate great ideas nobly conceived and boldly executed.

To the little garden belong the little things—the simple things, and if you have grasped what I have tried to convey, if you never try to *force* your design, if you always do the thing that the situation demands (and it will be a different thing in every case), then "the Master Artist who made the rainbow" will come along and complete your garden picture for you.

The CHAIRMAN: I am sure you would like to pass a unanimous vote of thanks to Mr. DILLISTONE. I really envy him, because he does, no doubt, in the course of his work bring restfulness into the lives of many people who without his skill would be condemned to live in a garden which was uncomfortable and restless. The examples he has given us to-day I think are a fine testimony to the skill with which he works, and I am sure I am interpreting the feelings of all of you if I thank him on your behalf for the very interesting hour which he has given us.

IX.—DUTCH GARDENS.

By J. R. KONING.

Chairman : Sir WILLIAM LAWRENCE, Bt.

THE CHAIRMAN : I inflict my observations on you so frequently that I do not propose to do so on this occasion, but merely to present to you Mr. KONING, who is the Superintendent of the Amsterdam Parks.

Mr. J. R. KONING : The history of Dutch gardening has been much discussed and described. The time at my disposal, however, is too limited for me to go into a detailed account of the origin of Dutch gardens and the further history thereof.

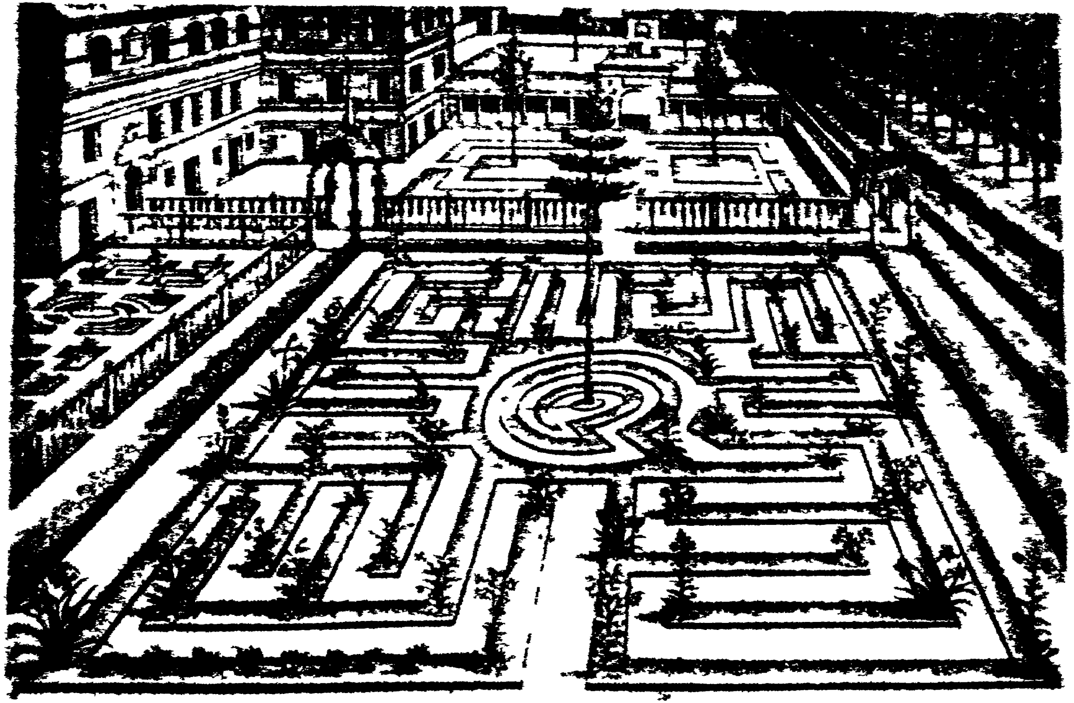
Dutch gardening originated in the sixteenth century under the influence of the Italian Renaissance but on much simpler lines.

In our country, also, the Renaissance gradually ran out into the baroque-style and still later into the rococo-style, in which coloured stones took the place of the flowers in the parterre-figures, and gilt statues, fountains, shells, etc., overburdened the gardens.

The man who gives us the best idea of the methods of gardening in the sixteenth century is JAN VREDEMAN DE VRIES, born at Leeuwarden in 1527. He was a painter, a sculptor, an architect, a man of many talents. He is the author of a volume which appeared at Antwerp in 1583 and which contains a collection of garden plans which he made for Holland after what he had seen of gardening in Italy. Whether he formed such gardens is uncertain ; most probably the gardens in those days were simpler than those he planned. We may assume, however, that his plans give us the ideal of gardening at that time. In most of the plans, which consisted of several quadrates, there was a maze (fig. 124). The planting was not the essential thing, but the clever division of the beds. The middle of the parterres was, as a rule, taken up by a cunningly clipped little tree, while other plants were regularly spread over the beds.

Intricate figures in garden decoration were the pride of gardening architecture in those days. Larger gardens were hedged in by laurels enclosed at the four corners by arbours.

The French style came to development in Holland late in the seventeenth century and, like the Dutch style, was modelled on the Italian architectural style. The great master of that style was LE NÔTRE, who purged gardening of the tastelessness of the baroque and rococo styles, and who for the first time introduced perspective into his works of art. His influence on his time was enormous, and the spirit of his works penetrated to the gardens throughout Europe.



Tuin met labyrinth door J. Vredeman de Vries

FIG. 124.—AN OLD DUTCH GARDEN PLAN

[*To face p.* 316

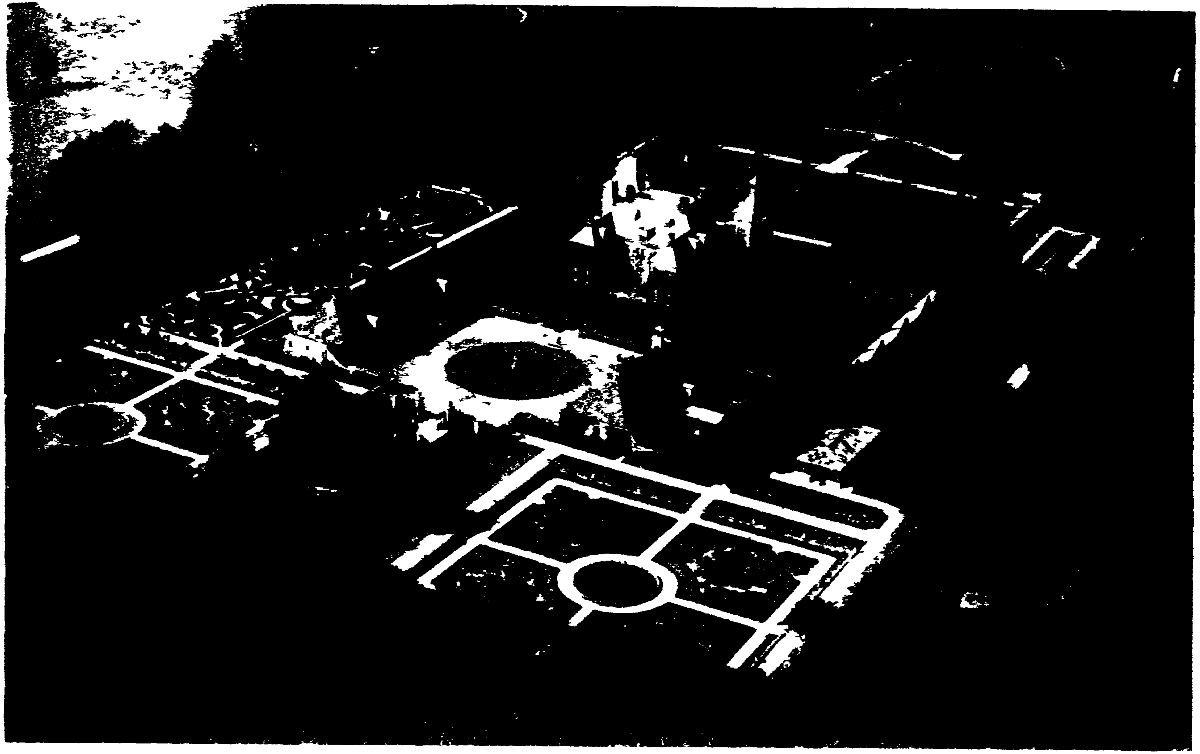


FIG. 125. AN OLD DUTCH GARDEN

In those days the gardens along the Vecht and in the surroundings of Haarlem were famous. All had their festoons, hedges, parterres, ponds, and pleasure gardens, and were for the greater part embellished by statues.

However, the monotonous narrow lanes bounded by hedges, which gave little or no perspective, could, in spite of the statues, ponds, etc., give little satisfaction, and the eighteenth century brought about a total reaction in gardening architecture when in England the landscape style came into being and reached high level. KENT, BROWN, and later, REPTON, were the men whose names will always be remembered in connexion with this reaction.

In Holland very little is left of the glory of the old eighteenth-century gardens (fig. 125).

The promoters of landscape gardening in our country were the ZOCHERS, father and son, who started laying out public parks in imitation of nature. It is true the plantations in many a Dutch town were confined to the planting of the levelled ramparts. In time, however, the planting of the outer walls with their green and their flowery growth spread throughout the town, and their offshoots are found in square and street, on quay and bridge.

Since the triumphant march of the landscape style over Europe a conflict has been going on between the advocates for the rectilinear garden style and those for the landscape style, which is not yet settled, and will not be settled as long as both sides bring forward striking arguments.

It was thought in those days by some, and is still thought, that a solution for a future new garden architecture is to be found in a combination and co-operation of the two modes, and many garden architects now make their plans, with full conviction, on those lines.

In Holland at the end of the nineteenth century great pains were taken with the laying out of public parks in and near the towns. What in former days was designed only for royalty and the wealthy is now done for the benefit of the public. Landscape and park architecture is beginning to assume a more and more important place on account of the laying out of public parks, public pleasure gardens, sports fields, etc.

When at the beginning of this century endeavours for the better cultivation of the soil and the preparation of the grounds attracted more attention, and greater want was felt for market garden ground on account of the increase of the population, these in many respects much-to-be-applauded efforts aroused a certain uneasiness in many minds, because the interesting flora and fauna of our country was being endangered. This uneasiness was all the greater because cultivation did not make allowance for scientific and aesthetic values.

The present means of conveyance renders it possible for a great many people from the large cities to settle by preference in the country, so that, on all sides, much of the country is being converted into villa-parks.

In our country, where the population is constantly on the increase, what remains of the untouched scenery is being threatened, and its disappearance gives rise to great anxiety.

The expansion plans of cities, which in former days never reckoned with the preservation of natural beauty, are at the present time worked out with great care. From many sides the need is even urged that provincial plans should be made, not merely expansion plans of great cities, because in those plans more areas for natural parks can be preserved.

The garden architects of our day reckon more with modern building, which takes a very important place in the larger towns in Holland. They demand more right of a voice in the expansion of cities. Their task is rendered more and more interesting by the expansion plans of cities and villages. They aim more and more at great lines in municipal plans, at satisfying solutions, and at the preservation of the everywhere threatened beauty of nature.

Much attention is paid to the smaller garden, the country house and its grounds, the small country residences, the summer houses in and round the towns, and to the city gardens.

Though Dutch garden architecture is beginning to develop more and more into an independent style, it cannot be denied that it is very much influenced by English gardening. Are we not trying to imitate your rock gardens, your flower-walls, and your borders ?

Here in England you talk of a Dutch garden and then you mean the Dutch Garden at Hampton Court and near Kensington Palace. In Holland precisely that sort of garden is called an English garden.

" A garden is a symphony " they say in your country, and we wish to feel the same about it. Every plant in the garden must have a mission, a meaning, a task. Its place must have a motive. The forms and colours must be well chosen so that before everything the owners of those gardens may acquire a true feeling for flowers.

Modern garden architecture cannot be learned only by the planning and designing of ground plans and garden plans. The captured and subjugated plants must be freed by the garden architect, and must develop into personalities ; because plants make the gardens, not people.

Our principle must be to take the beauty of the plants as the starting-point in garden architecture, thus letting the nature and the grace of the plants sway freely and unrestrained in our gardens.

Fortunately we have in Holland excellent nurserymen, who supply us with an ample choice of plants, which we have to arrange.

As landscape architecture, garden architecture has at the present time fallen into decay. The fear of sunshine in the rooms and the curiosity of near neighbours which led fifteen years ago to the laying out of tasteless, closed-in gardens in the landscape style, has sunk into the background. The rectilinear construction can be applied with much more success, because high trees and hedges always prevent plants and flowers from reaching full development. If the garden or the park joins on to landscape, all pettiness and artificiality must be avoided.

At the end of the twentieth century we shall not be able to show so many beautiful estates and country residences as we can now. Public parks will for the greater part have replaced them.

The task of a city is to give a town a beautiful and friendly aspect by the laying-out of plantations and to break the monotony of the streets by planting trees, etc. On the other hand a need has arisen for large parks in which people can walk and imagine themselves far from the madding crowd and the dust of the city.

The inhabitants of the big Dutch cities, which are not situated in the near neighbourhood of sea and dunes, are in want of extensive grounds where they can spend the day and where they can find the rest and the repose that only green and flowers and free nature can give.

Sport is constantly claiming vaster tracts of ground in the immediate proximity of the town. Whole quarters are already reserved for recreation grounds.

Under the capable direction of an English golf architect, Holland has of recent years laid out some golf links. They are conceived as great laid-out parks where the Dutch garden architect can display his knowledge and his views.

I have told you already that your Dutch garden is our English garden. The most beautiful example of an English garden, which will always be the admiration of Dutch garden architects, is the garden round the Peace Palace, laid out by your famous garden architect, MAWSON.

When we really want to enjoy something very beautiful in the domain of garden architecture then we visit that Peace Garden.

Is it not the task of us all who are engaged on one of the finest spheres of activity—the culture of nature—to procure a garden of peace for one another, no matter where, or whether it be in French, Italian, English, or Dutch style ?

The CHAIRMAN : On your behalf and on behalf of the Royal Horticultural Society I wish to tender our very hearty thanks to Mr. KONING for his exceedingly interesting lecture, which was so beautifully illustrated by photographs, especially the old reproductions and engravings. I thought they were very attractive and interesting indeed.

One matter occurred to me when I was looking at that picture where the gardeners were, just as Mr. KONING said, "clearing out the bulbs preparatory to planting the garden," I presume with some flowering plants. We have got here, as you know, a very beautiful new Hall, and the centre of the Hall has been laid out in a series of what are very much like little flower-beds for the purpose of showing the statuary. I hope that some time an attempt will be made by the Royal Horticultural Society to hold their exhibition of bulbs on these lines. I think that Hall would look perfectly beautiful if it was arranged in formal beds, and each bed was given to one or other of the nurserymen or amateurs, who would plant them with their tulips, hyacinths or daffodils, and clipped trees, of which there are a great number to be had in this country—they come from the Continent. If these were disposed so as to create the illusion of an old Dutch garden, it would look very pretty indeed, and you would be able to see the bulbs to their great benefit. This Hall seems to me to be very well suited for that purpose. As you know, Messrs. Sutton and the other firms do very often make these grand shows of tulips in the old Hall; if this could be carried out on a big scale in the big Hall, I think you would all be very pleased indeed.

If there are no questions, I will offer Mr. KONING a very hearty vote of thanks for his very interesting lecture.

X.—THE PLACE OF ORNAMENT IN THE GARDEN.

By Mr. CHRISTOPHER HUSSEY.

Chairman : Lord STANMORE, C.V.O.

THE CHAIRMAN : Ladies and Gentlemen,—I think that the fashion for garden ornaments may be said to date from Elizabethan times, with the introduction of leaden figures. It is true that in garden walls of an earlier date niches are to be found which it used to be thought were intended to contain statues and urns, but later investigation points to the fact that these were really meant for braziers which were to warm the walls for the protection of the fruit.

At the beginning of the seventeenth century there was a change in these matters. INIGO JONES and others employed stone both for ornaments and for statues, the Italian Renaissance was beginning to have an influence in England, and this was further accentuated by the arrival in this country of the Arundel marbles. I think that CHARLES I must have had garden ornaments in his mind when he instructed Sir KENELM DIGBY, who was cruising in the Mediterranean, to visit the coasts of Greece and bring back some good grass ; Nicholas stone also belongs to that period, and I think we may look upon the beautiful York Watergate as a good garden ornament.

During the Civil Wars of the Commonwealth very little was done in this direction of course, but with the Restoration interest revived and the Dutch influence was introduced. Many Dutch settled in London at Hyde Park Corner, where they had yards, and WREN employed these Dutchmen to make what he called " strange conceits." All through the eighteenth century they remained at Hyde Park Corner, and it was from one of these yards, Cheere's Yard, that the great Rubiyat came forth. THORNTON wrote a few verses on the subject. I remember the first lines were :

"Now from Hyde Park Corner come
The gods of Greece and Ancient Rome,
See the Cupids and the Graces
With their stupid, leaden faces."

After that period came the introduction of stone figures. The most remarkable examples of these are at Syon House, where there are two magnificent beasts at the entrance gates. From that time to the present day—and the beautiful things that are cast in cement and other artificial stones which we have had an opportunity of seeing to-day—is but a short step. I have been examining the Exhibition with great interest and care as a preparation for the lecture to-day, because I felt that I required a little more knowledge on the subject of Mr. HUSSEY's lecture, which I am sure will still further add to our store of information. I will now ask Mr. HUSSEY to address you.

Mr. CHRISTOPHER HUSSEY: I address you with some diffidence, since probably everybody here this afternoon could teach me a lesson in the practical handling of plants. But fortunately my subject is not one for which great horticultural knowledge is required. It is architectural, rather.

The ornament referred to in the title of this paper I take to mean the forms and features that a designer uses in shaping a scheme. They may vary in size from a terrace to a sundial. Thus, statuary, on which Mr. BAYES has addressed you, is only one type of ornament, and one on which I shall touch only lightly. I must also as far as possible avoid the larger subject of design, and limit attention to its architectural or artificial adjuncts. As the past history of design has been the subject of a paper by Mr. AVRAY TIPPING, and has been outlined so ably by our Chairman, I want to turn attention to the possibilities for the *modern* use of garden ornament. There is no doubt that to-day architecture is the most potent extraneous influence on the design of gardens. A century or so ago landscape painting occupied this position, and two hundred years ago the lay-out of grounds was almost a branch of the art of the theatre, so pre-eminent was the desire for a dramatic setting for the ceremonies of life. In neither of these phases was much use made of flowers, owing partly to the comparative paucity of species then available, partly to the origin of the fashionable styles; in one case Italy, with its extreme climate, in the other the landscape paintings of CLAUDE and SALVATOR ROSA.

Landscape is still the most important element in the English garden. But our attitude to it was modified in the nineteenth century by the picturesque revival of Italian formal design, and by the botanical discoveries of travellers and nurserymen, which showered upon us a previously undreamt-of wealth of natural forms and colours. We thus have to-day three elements at our disposal: landscape, the flora, and architecture.

At this point I must make clear my view of the part to be played by ornament in uniting these three elements. We might define ornament's proper purpose, at any rate in England, as the provision of forms appropriate in idea to the spirit of their surroundings, and in form to the habits of plants; and the fashioning of those forms with materials of suitable texture. Our equable climate makes of flowers and shrubs our chief interest in gardens, so that to aim too exclusively at architectural effect is to waste both money and opportunities. Similarly, to shut our eyes to the picturesque possibilities of our meadowland and woodland is to neglect England's chief beauty. The claims of architecture, therefore, are subservient on the one hand to the picturesque, and on the other to the flora. It should be a foreground for the one and a frame for the other. Architecture can form the skeleton of a design, but flowers should almost hide that skeleton, and it should melt picturesquely into the surrounding landscape.

This triple mode is the result of the warfare waged round about the close of last century, when the doctrine of the wild was preached by

Mr. WILLIAM ROBINSON and the merits of formality were championed by Sir REGINALD BLOMFIELD and Mr. INIGO TRIGG. Both schools of thought are as alive as ever. Mr. ROBINSON himself, Miss JEKYLL, and Miss WILLMOTT have as many followers as the architects. But as their doctrines were assimilated, a group of designers arose who aimed at uniting the methods of both parties, to use architecture picturesquely as a frame for the house, but to let formality melt into wildness farther off. I need only mention Sir EDWIN LUTYENS, Mr. HAROLD PETO, and Mr. AVRAY TIPPING as foremost developers of this picturesque-formal method, though each holds a different opinion on the desirable ratio between landscape, flowers, and ornament.

It is acknowledged by all parties that the immediate surroundings of the house need to be predominantly formal. The problem in every case is, How far and how much formality should radiate from the house ? A formal house naturally needs a more formal setting than a farm-house. The more distinctively modern types of architecture in particular require severely stylized surroundings, defined by lines related to those of the buildings. But in all branches of garden ornament and design the modern desire for simplification is noticeable ; a preference for clean lines, simple masses, definite forms.

As an instance of modern buildings needing a stylized setting, I may contrast the treatment of gardens at the Wembley Exhibition, and at the recent Press Exhibition held in Germany, at Cologne. At Wembley a tenuous water-garden, picturesquely treated, occupied one of the central vistas among the vast buildings. On the banks of the water were grouped large quantities of ornaments, such as lead storks and stone objects. Though tasteful in its way, the effect was exceedingly weak against the severe and ponderous buildings. At the German exhibition I was struck by the close relation of the layout to the rather harsh architecture. It is a pity that no photographs of this scheme are in the German exhibit in the Main Hall.

One species of flower was used in enormous quantities to form sheets of colour defined into somewhat angular shapes by box edging, accentuated by miniature escarpments in the adjoining lawn. I saw a red Polyantha Rose used in this way below a low circular terrace, round a fountain basin some eighty yards in diameter, and in harmony with a vast semicircular loggia of rosy brick. The effect of this modernist parterre of red and green, patterned into planes related to those of the architecture, seemed to me an example of contemporary garden design as impressive as the Wembley example was weak. Both these examples are of public urban gardens, so that the lesson does not apply literally to the normal problems with which we are confronted here, where even modern houses are generally in the gentle Queen Anne tradition. But it throws light on the relative values of the stylized and the quaint, and the time may not be far distant when increased attention may be turned to the provision of public gardens and their suitable ornament. We would see then whether our national love of rural simplicity will still make us imitate a field, complete with sheep, in the middle of a city, or whether more artificial stylization will be required.

In some respects garden ornament plays a more subordinate part in England than in any other part of the world, owing to the ideal nature of our climate for providing flowers all the year round, which obviates the need for architectural decoration. In Renaissance Italy, in baroque Spain and Germany, and the Versailles period, the formation of pleasure grounds largely without flowers developed the arts of design and decoration to their highest refinements. A modern example of this type of ornamental garden is to be found near Stockholm in Herr MILLES' highly personal pleasaunce, which is well illustrated in the Swedish exhibit in the Main Hall.

It is essentially a sculptor's garden. In a small space, high on a rock above the sea opposite Stockholm, he has arranged a paved court with a terrace below it, wherein are set some of his most effective works—fountains in black marble and statues in bronze. The lay-out is compact and simple, and for obvious reasons few flowers are used. It is referred to here as an extreme form of the modern stylized garden. Ornament here plays the predominant part. But if it were in England we should, I think, feel acutely the absence of vegetation and the hard effect of the linear design. We should want atmosphere, softer lights and shades, and the many hues of flowers. But in England such an artist as Herr MILLES would have availed himself of our climate, and have laced his forms with flowers, banking up his terrace with herbaceous masses, and filling in the design with shrubs. His most important sculptures would stand out, but the lesser ornaments would be used as points in a floral design.

Having now suggested the part that ornament plays in the formation of gardens, I will take some of the principal features one by one, beginning, in imagination, from the house itself.

At the base of the house as seen from a little way off, the eye likes to find a cleanly defined line for the house to stand on, such as is provided by a terrace of mortared paving reflecting the light. There is no need to enlarge on its practical advantages. From the point of view of design, however, full use is not often made of the reflecting surface of the house-terrace and its steps. The terrace itself and the base of the house are often allowed to be obscured by vegetation, or by balustrades, the effect on the house being to upset its proportion and to blur its junction with the ground. In the case of a large proportion of houses this does not much matter. But if a house has any pretensions to refinement of design a clean base-line contributes greatly to its beauty. The demand for vegetation beneath the windows—it is pleasant to have sweet-smelling plants there—can be met without suffering them to obscure more than a small proportion of the base-line. In instances where a clean terrace at the base of the house is impossible, the prominent horizontal line that the eye requires can be provided by a lower terrace as at Ednaston in Derbyshire, by Sir E. LUTYENS, where the steps and terrace form a perfect base for the house.

As to the surface and use of this flat area, there are many possibilities. As its function of providing a base for the house arises only when it is seen in sharp perspective from some distance away, there is room for considerable variety of surface treatment. Only fine classic façades need an uninterrupted base of mortared paving. On such a terrace knots of stone crops, small lead ornaments, and pots are much better away, though in front of a more picturesque house uneven paving and vegetation are very charming. Brick and stone paving, with the stone forming a simple pattern of light lines, harmonizes very well with buildings of the same materials. A device that might be used more is that of small sunk parterres, clipped level with the surface of the paving and patterned with two or three kinds of dwarf perennials with different coloured foliage, as at Port Lympne, Sir PHILIP SASSOON's house.

The subject of paving may lead us on to consider paths. So long as the garden is formal in character, paved paths are desirable both for appearance and permanence. But the extreme formality of cemented paving can be dispensed with when the terrace is left, the stones being instead bedded in sand. The aim should be gradually to deformalize the paths the further they are from the house. There are many alternative sorts of paving. There are slabs set like stepping-stones in lawn ; there is brick paving, better mortared than bedded in sand when grass soon establishes itself in the interstices and makes the path look untidy. Or a grass walk can be paved down the middle or along the edges. In some of Sir EDWIN LUTYENS' lay-outs a central strip of paving has a deep water channel in it, in which grow irises. At Hestercombe, Somerset, LUTYENS has used rough slabs to form a patterned frame for turf in a great plat on which you look down from the house. Besides forming a bold pattern, the stone provides dry walking in winter, and in summer prevents the overhanging plants in the adjoining beds being bruised by passing mowing machines. The sundial has been made taller than is usual to form a bold centre to the plat, and is provided with steps to stand on.

In Italian gardens great play was made with patterned marble paving. We can do nothing so sumptuous, and indeed, have no need to. White paving stones and mown grass sunk to the level of the stones provide a beautiful substitute. Mr. BASIL IONIDES has made fine use of this combination at Encombe, Hythe. There is a marble well-head surrounded by alternate circles of stone and grass, with here and there a terra-cotta pot containing Madonna lilies. The design in green and white, with a white pergola and dark Ilexes beyond, is enchanting.

In simpler taste, millstones, tiles, and uneven pieces of stone arranged in patterns in a regular path provide those soft harmonies of tint that our grey skies beautify, but the danger always is that the effect will be spotty or fussy. The popularity of " random " paving seems fortunately to be waning, partly no doubt owing to the ease with which anybody can now make his own paving stones with sand, gravel, and cement. Excessive overgrowth on stone paths or terraces, like crazy paving, is to be deprecated for its artful rusticity and unintelligibility. Stones *naturally* irregular, being more rounded, can be used with more success, but it is well to pass over their irregularity with mortar rather than to accentuate it. On the other hand, the crazy paths one sometimes sees laboriously pointed with mortar like a wall are surely the worst of all.

Steps possess decorative and suggestive capacities as important as their practical function. In the baroque age the hilly gardens of Italian villas provided scope for veritable dream stairs, dividing, circling, reuniting, twisting, perhaps among waterfalls, or even made of water only. The empirical decorative quality of steps is primarily in their alternation of horizontal bands of light and shade—shining treads and dark risers. If this is always borne in mind their actual design, and proportion of rise to tread, will follow naturally. Thus steps are much more effective when the tread distinctly overhangs the riser, throwing a band of shade. If the rise is too steep in proportion to the tread, not only will the ascent be tedious but the surfaces of the treads will be too narrow to reflect sufficient light to contrast adequately with the dark risers. Conversely, if the ascent is too gradual the feet have a tendency to trip if they go up one step at a time and to slip if they essay two or more, while the light surfaces approach equality with the dark. The dark should exceed the light area by 2 or 3 to 1. Naturally lighting and point of view are variable, but there is generally a point where the spectator tends to halt and survey the view—where the house or scene fits into his angle of vision—and from here the design should be directed.

The *slope* of steps is an important consideration. Just as equality of light and shade is to be avoided, so is an angle of ascent verging on 45°. The eye hates not seeing in a flash if a form is high or broad, a slope steep or easy. This criticism seems to me to apply to the steps at St. Catherine's Court, near Bath. This generalization affects the proportion of width to length in a flight of steps. Thus, a long flight, with great vertical height, can be narrow, accentuating the loftiness of its summit, and a short flight like that at Wilton is more impressive when broad. But when circumstances would approximately equalize width, height, and depth, threatening an architectural platitude, recourse should be had to diplomacy. Instead of the steps breasting the obstacle at right angles, they can, if it is very steep or vertical, be carried up its face sideways as was frequently done in the great Renaissance gardens and as we see at Powis Castle. There are few more satisfying forms of stairway, its disposition enabling it to be ample and dignified, ascending in a series of flights, and the tiers of steps to be seen in perspective. For the view straight up a steep stairway is as unpleasant by association as in itself, and from any other standpoint the steps are scarcely seen at all.

Another way of evading equality of height to width is to adopt for the steps a semicircular or rectangular plan, so that, seen in elevation, the flight has the beauty of a triangle or cone. Any projecting flight is made more effective if it narrows as it ascends, thus exaggerating the perspective. The old steps at Newton Ferrers are a delightful illustration of this point.

As to materials, so far as they affect the eye, excessive perfection of workmanship produces a hard effect, whilst excessive craziness looks affected. There is no better mean to aim at than the slightly broken, rounded regularity of old worn steps with a distinct overhang. Where slate or large rough slabs of a local stone are available, steps are ready made. Those by Sir E. LUTYENS at Hestercombe are an example. When brick is used, the play of light is beautiful if the bricks are laid on their edges. Bricks are particularly effective in rounded flights, for then the end of each brick is at a slightly different angle from its neighbour and a series of innumerable facets is provided for the play of light and shade as the sun moves round. Grass steps are scarcely worth the trouble that their maintenance and mowing involves.

The use of balustrades is not frequent nowadays, anyhow on a scale such as exists at Stoneleigh Abbey, owing to their expense ; and in any case the intervals for balusters to be set at—the secret of successful balustrading—is an architectural formula. One or two alternatives to the piers that give the appearance of strength to a balustrade may, however, be noted. At Newton Ferrers, in Devonshire, the granite balustrade has no piers, but an amusing effect is produced by setting a ball on every fourth baluster. At Nashdom, Taplow, Sir EDWIN LUTYENS has broken a balustrade for the insertion of square tabs. Nowadays solid parapets are in more general use than balustrades, as they are cheaper and generally as satisfactory. Open-work parapets, constructed of tiles or bricks, are on a par with sham half-timbering.

One of the charms of a parapet is the way in which it asks to have things stood on it : urns, pots, statues, or what not ; as at Powis Castle, which brings us to the most obvious department of our subject. I will not go into the matter of sculpture, as Mr. BAYES has already addressed you upon it far more ably than I could hope to do. I should, however, like to make a few general remarks and to say something of the place of sculpture or objects in a design.

There is no better setting for a statue than in a garden where the sculptor is freed from the necessity of being monumental, a quality that few now living embody in their work with success. It must be owned, however, that too many English sculptors have abused this opportunity for informality, with the result that there are few statues of any formal beauty at all to be obtained for garden decoration. If you walk down King's Road, the vendors of lead figures will show you scarcely anything that Cheere or Van Nost, the famous statuaries of Hyde Park Corner, would have admitted to their yards for an instant. The ornamental masons have been scarcely more successful with stone pedestals and pots in spite of the range of models available. The exhibition displayed in these Halls, however, provides unmistakable evidence that alternatives are being found to the adipose putti and

Japanese storks with which we are rather too familiar. A statue can embody in its form the most delicate associations that a garden arouses in our thoughts. A statuary, then, has surely a large enough store of association to draw upon in order to imagine sculpture suitable for garden display. Fat children are all very well, but so few of them are able nowadays to do anything besides hold festoons of flowers. There was a time when they fought together, or acted the four seasons, or played with a swan, as in the eighteenth-century lead examples. But surely we think no more instinctively, in a garden, of babies than of all those other charming creatures who once peopled the groves: centaurs and lapiths, nymphs and fauns, shepherds and shepherdesses, Diana, the Muses, or simply beautiful mortals—athletes, wrestlers, virgins—who rarely inspire our sculptors. Yet beauty of body, athletics, and grace of movement are studied more enthusiastically to-day than they have been at any time since Ancient Greece, and in America already athletics are stimulating sculptors to a renewed study of the nude in graceful poise and rapid motion.

I am sure we all agree that this Society has earned the gratitude of public and sculptors alike by the extraordinarily interesting assembly of sculpture downstairs. It does show what a wealth of talent we have if only it had more opportunities and was better known. Moreover the Exhibition enables us to see what the general tendency of such work is. It seems to me that the statues which we should probably agree upon as being the best are distinguished above all by grace of poise or line. Personally I have been rather disappointed that there were not more examples of figures in graceful or striking attitudes, such as we can see in the Swedish photographs. The very large proportion of child-statues is no doubt a sign of their popularity. But it seems to me to point to a certain poverty of ideas. What a wealth of ideas and models for suitable statues there is in our museums, for example! The authorities, however, give no facilities for the reproduction of our unsurpassed wealth of ancient and eighteenth-century sculpture, though the Naples museum, I believe, will reproduce the Pompeian bronzes at a reasonable price.

The taste for *urns* has unfortunately gone out of fashion with the taste for sensibility. Yet in a gloomy walk or beneath a laurel what is more charming than a svelte stone urn? The nineteenth-century cement "vawse" has perhaps prejudiced us against this intrinsically beautiful form.

However, terra-cotta oil jars and pots are perhaps more suitable to the horticulturist. The material harmonizes well with brick, and the shape is a noble one. At Folly Farm Sir EDWIN LUTYENS has raised an oil jar on a stone plinth and allowed its pure form to be the centre of interest of a small paved garden. A less successful importation is the white marble well-head from Italy. In order not to stand out whitely from its setting it needs to be very carefully placed amid light stone surroundings and with plenty of green about it and pale flowers such as lilies, wistaria, or irises.

The formal function of sculpture is to stress a point in a design, though even in England it has sometimes been used *à l'Italienne* to form an avenue, with a background of dark evergreens. But it is most effective when used most sparingly. A sundial at the meeting of four ways, the silhouette of a graceful lead figure seen through an arch against the sky, or Cupid fluttering on a pedestal above a rose plat—thus placed, sculpture adds both point to a design and an *idea* to a picture as nothing else will do so well.

Topiary is the natural and most fertile substitute for sculptural and architectural ornament. I am inclined to think that it still has a great future before it. If architecture and with it garden design become harsher and more stylized as they are doing in Germany, Holland, and France, topiary can best provide the desirable abstract forms. Long ago a kind of abstract sculpture was evolved out of topiary. We see purely geometrical forms shaped in yew in many an old-world setting: there are yews like giant chessmen, or like the conventional trees in a modern stylized painting. And there are yew walls, as broad as they are high, shaped into bold cubes, obelisks, pyramids, and overgrown yews like giant toadstools. They look especially well above a terrace, as at Powis Castle. An imaginative mind could shape yews into a hundred forms more interesting than the familiar peacock and more expressive of our geometrical modern art.

But as a rule topiary should be used with restraint; it provides the ideal formal background to flowers, and, if treated broadly, an admirable foreground to views of landscape or of the house, as in this sixty-year-old hedge at Sudeley Castle. But a regiment of clipped yews dotted all over a garden produce an undesirably spotty effect, distracting the eye from the main design or the quiet beauty of the house. The famous gardens at Levens Hall, like a fancy-dress ball in the palace of the Sugar Plum Fairy, are more of an historical curiosity than a model for imitation. Topiary's best use is in dividing up a lay-out into a series of secret enclosures and related parts, with broad simple masses that are always plastic with light and deep shade. There are some splendid examples of well-used topiary in yew, box, Thuya, and so on, among the Swedish photographs downstairs.

If topiary provides admirably the great dark lines in a lay-out, water will bring the sky itself into a design. Though leaping fountains are fascinating before a palace, the most moving aspect of water is in its still reflections. A large lake either does or does not exist in a place. But it is open to most people to introduce a formal pool to reflect the changing picture of the sky or the deep shadow of neighbouring trees, as do the pools at Bicton. Regarding a pool as an ever-changing picture, its frame should be left as plain as possible. Where there are plenty of high things for it to reflect, the basin should be brim full. In the middle of a flat space, on the other hand, where the eye is perforce at much the same level, it needs more architectural or horticultural treatment, either with sculpture, balustrades, or water-loving plants. The mixture of plants and architectural forms in a pool needs careful thought. When the pool is wild, vegetation can ramp as much as it will. But if it is architectural there is a danger that water-lilies, irises, and too many pots on the brim will produce a busy or straggly effect. The brim should in such instances be left clean and decisive, and where vegetation is to predominate, it should be made to do so in a mass of bloom.

Though we have become unjustifiably estranged from dolphins and dryads, preferring to unite water with flowers rather than with architecture, there is no denying that a fine active fountain, well maintained, and not so infrequently played that its antics are viewed with the solemnity due to a rare ceremony, is a source of delight. The brilliant contrast of dancing refracting jets against trees or shaded buildings gives the eye that stimulus which is at the root of impressionist painting. A single solitary jet in some suitable setting, for choice where there is a dark background, has the beauty of some miraculous flower ; or seen against a soft far-spreading landscape, as at Port Lympne, designed by Mr. PHILIP TILDEN, a fountain dancing like a sylph upon a floor of glass. The home of fountains is in the old Italian gardens. On the slopes of the Alban and Sabine hills water is in abundance, pressure to be had for the tapping, and the hanging hillsides form a perfect, because explanatory, background for fountains. Whatever be the shape, a fountain is most satisfactory, because least far-fetched, when the source of pressure is apparent. Both for this reason and for the impressionist value of the contrast a fountain *below* a terrace or hill is more beautiful, though less amazing, than a fanfare of water spurting in a plain.

But most people are satisfied with the murmur and lazy splash of a quite small fountain or dripping well—" one that spouteth rather than sprinkleth into a fair receptacle," to use Bacon's words. If a babbling fountain is near the house its sound is all the more grateful ; and more so if it can be seen from within, when, with the variations of light and shade through the day, it provides a lively and changing ornament. A very popular form of fount is that derived from the natural dripping well, consisting of a circular pool half vaulted over, and a spouting mask. There is a photograph downstairs of a charming one by Mr. OSWALD MILNE. On the vault the reflections play like luminous airy fish, and against its shade the jet of water falls in a diamond bow. There is plenty of scope for sculpture in the invention of spouting masks, and our sculptors have taken advantage of it. If a statue is placed in the centre of a pool it is important that it should be sufficiently dominant, not so much of the pool as of its surroundings. The new Mercury in Tom Quad at Christ Church, Oxford, is large enough for the pool but not for the Quad. In so large and imposing a space something like the great Jacobean fountain at Trinity, Cambridge, is needed.

The last form of ornament that I have time to allude to is pergolas and treillage. It is at first sight strange that the pergola, for long in use in Italy, has been adopted here only so recently. The reason was partly, no doubt, the comparative lack of suitable flowering climbers. Wistaria, for instance, was not introduced till 1818 and rambler roses did not become popular till the middle of last century. A permanent structure, especially as to the piers, is highly desirable. Whether they are to be marble pillars, or of brick or stone, or, as so often in Italy, of roughly plastered rubble, must be decided by the nature of the garden. In association with a paved path and green plants, marble is, of course, the most beautiful material. But rough stone is generally more suitable to England. At Hestercombe, Sir EDWIN LUTYENS has used the local stone which is obtained in small thin slabs, and alternated round and square piers to obtain variety of light and shade. The pairs of piers should be tied across the path with a stout beam slightly arched. The upward curve, however slight, has a satisfying appearance and is, in fact, a source of strength. If the pergola is for roses, it is better not to have it continuous, but as a succession of piers and transverse beams only, so that the roses have the benefit of light and air all round.

If pergolas are a recent introduction, treillaged walks are one of the oldest forms of ornament. A reproduction of the Jacobean form is to be seen at Easton Lodge. But trellis work has not often been used to the extent it was during the Versailles period abroad. There its chief function was, in the shape of walls, arches, and arcades, to conceal the " unsightly " trunks of the trees that composed the groves and bosquets. To these it gave the necessary formality. Nowadays it is perfectly adapted to the formation of out-of-door dining and sitting rooms, and for the adornment of unsightly walls in town plots. A word may perhaps be said for the iron or wood trellises so often found supporting the curved sheet-iron roofs of early eighteenth-century verandahs. Not only are these verandahs charming in themselves, but a little trellis suits them well. Many modern houses approximate to the simplicity of those " villas " and could be suitably adorned in the same way.

If this paper has tended to be a catalogue *raisonnée*, it is because that danger is inherent in its subject. I have tried, however, to make clear the fact that in England ornament is best kept subsidiary to vegetation and is best of all when it is simple in form and broad in treatment.

The CHAIRMAN: Mr. HUSSEY has very kindly consented to answer any questions if ladies or gentlemen would like any further information on the points he has discussed.

. . . I would very much like to ask if Mr. HUSSEY would give us an opinion on the question of Miniature Gardens, as this is an International Exhibition, and the way the Japanese work the small garden. The Japanese really are the only people who have a meaning in miniature gardens, and many of the little miniature gardens we have been seeing at the Fortnightly Shows are really rather monotonous.

I understand they are not going to be continued, yet there is some real meaning the Japanese can give us. We have been seeing here these great big gardens and beautiful statuary, all eloquent of the past, and it does make us feel that a great number of people live very cramped lives. Perhaps the Japanese might be able to tell us the real poetry and the underlying symbolism they have in those tiny things. Could you just give us an idea of the Japanese garden and whether you think English people can be brought to see these things from the Japanese point of view?

Mr. Hussey: The whole idea of the Japanese science of landscape is exceedingly beautiful, but it always strikes me that Japanese gardens are rather out of place here because we do not know their meaning, and in Japan their use is the result of many centuries civilization. In Japan and China the landscape is part of their religion, and every shrub and type of rock and bridge and tree has a mystical meaning. Short of our adopting the beliefs of the Chinese and the Japanese, I do not see really how their ornamental objects are to have full meaning for us, though no doubt subordinately used and with feathery plants such as bamboos, they can be used very prominently over here if they are kept separate from our own landscape.

. . . I think your questioner has made a very important point. The sort of thing we have just seen is most beautiful and useful, but it is not very much use to the average poor person I think I can rather contradict what has been said about the Japanese Garden and the spirit of it, because some years ago I was at an English exhibition, and I was admiring a very beautiful English garden, just a landscape and a waterfall, and a few shrubs and rocks, purely English—it could not have been more English. In front of this landscape there was a Japanese, very delighted indeed, and I said to him "What do you think of this?" and he said "That is what we call a garden in Japan." I said "There is nothing Japanese in it," and there was not; and I turned back to a very ornate Japanese garden made by an English firm and I said "What about that?" He said "That is not like a Japanese garden, that is a lot of importation. We mean simply something that is beautiful and reproduces Nature, and which follows the laws of art." I said "The spirit is the same in both countries. It is simply something which has points of art on a small scale." Therefore I think it is right that we English people everywhere should have that same culture and the benefit of it in our homes and gardens. We are ripe for it, and I for one who am a small landscape gardener, without any desire to import anything Japanese, would like to do that sort of thing.

The Chairman: I should like on your behalf to thank Mr. Hussey very much indeed for the most interesting and entertaining lecture that he has given us, and I shall ask you now to signify your assent in the usual manner.

FIG. 126. TOWARDS THE GARDEN DOOR

(P. 315)

[*To face p.* 332

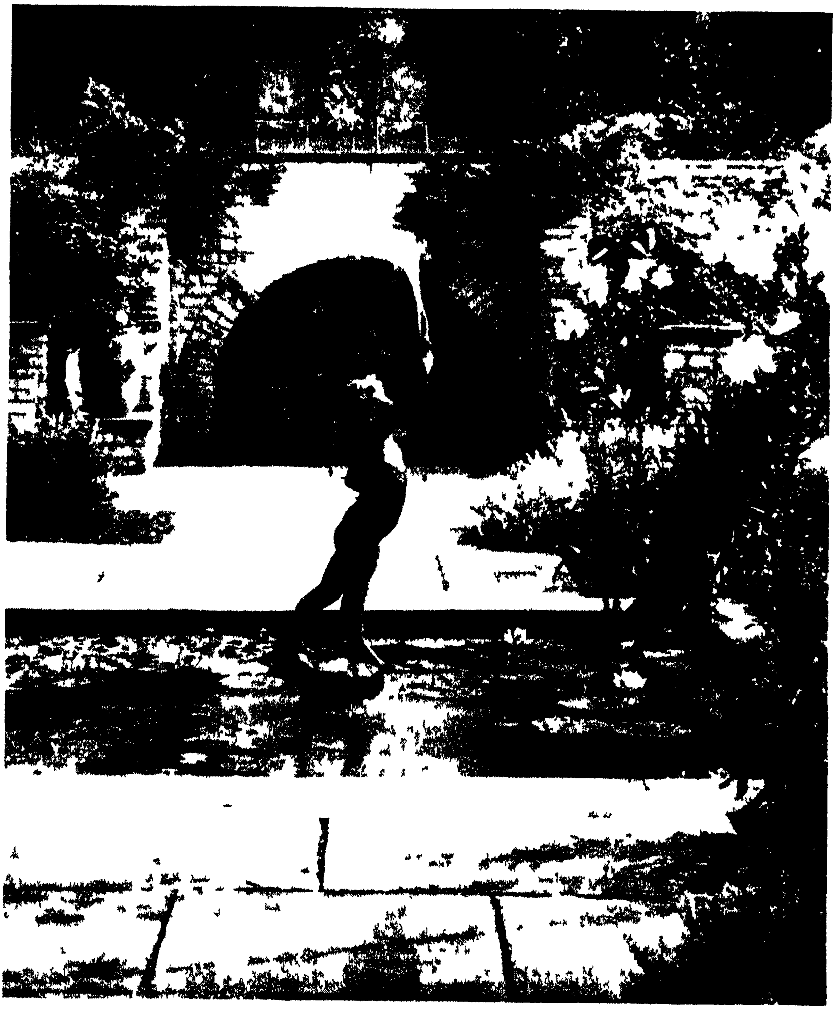


FIG. 17. WITHOUT THE GARDEN DO

[To face p. 335]

XI.—MODERN TENDENCIES IN THE DESIGN AND EQUIPMENT OF PUBLIC PARKS.

By Mr. E. Prentice Mawson, F.R.I.B.A., M.T.P.I.

Chairman : Sir Lionel Earle, K.C.B., K.C V O , C.M.G., J.P.

The Chairman : Ladies and Gentlemen,—I have been asked by the Council of the Royal Horticultural Society to preside at this meeting to-day when we are to have the honour and advantage of hearing Mr. Mawson. Mr. Mawson, as you probably know, who is to address you on the subject of "Modern Tendencies in the Design and Equipment of Public Parks," is a member of the well-known firm of landscape architects. The reputation of the firm in town-planning is well known, not only in this country but throughout the civilized world, and the services of Mr. Mawson's father as Past President of the Town Planning Institute, and as a member of the Royal Fine Art Commission, have been of national importance. It is, therefore, pre-eminently suitable that an address should be given by Mr. Mawson in connexion with an exhibition of this character.

As evidence of the great interest taken throughout the country in the subject with which Mr. Mawson is dealing, I might say that no fewer than thirty-three corporations, amongst whom, to mention only a few, are Birmingham, Blackpool, Liverpool, and Manchester, have contributed exhibits for the Exhibition which you see behind me. Furthermore, the land north of the Tweed, which has contributed so many of our best gardeners, is as usual well to the fore, and is represented by exhibits from Aberdeen, Glasgow, and Edinburgh.

The Exhibition is intended generally to show the historical development of the public parks and gardens in the respective towns, and in particular instances to show the new works which have been carried out in recent years. I think particular mention should be made of the fine exhibits provided by the London County Council of works in the Metropolis.

Nor is this all, as this afternoon Mr. Pettigrew, from one of our most enlightened cities, Manchester, will give a lantern demonstration with slides particularly designed for representatives of the chairmen and park superintendents of the corporations attending the Exhibition. I should like to take this opportunity of warmly thanking these representatives of many corporations for their presence here to-day, some of whom I have already mentioned specially, but to all of whom the country at large is greatly indebted for their successful efforts to bring home an appreciation of the beauties of Nature to the people of Great Britain.

There is only one other thing that I should like to add. I happen to be a member—and a considerable honour it is to me—of a Royal Commission which is at present sitting in connexion with museums. I do not know whether any of you have seen our interim report, but there we have said that in our opinion the national collections are not properly housed, that the casket in many cases is not worthy of the contents. I might say that I think as regards the Royal Horticultural Society, they now have a casket which is fully worthy of the contents, and I must say, although I do not know this building well, I have watched it growing up with great interest, and I think it is really a worthy setting for this admirable Exhibition, and for the many shows which during the year delight the public of London.

I will now call on Mr. MAWSON to give his address.

Mr. E. P. MAWSON : The subject on which I am to address you is "Modern Tendencies in Park Design," but before I attempt to do so, or to indicate the manner in which these tendencies should operate, it will be necessary to show very briefly how they have grown up and where we stand to-day. Only by a thorough understanding of the position as it exists can we hope to build soundly and well in the future.

One has only to cast one's memory back a very few years to realize that, in the lifetime of the youngest of us, a momentous and radical change has come over the whole theory and practice of park design. This change has, I am persuaded, been the product, in the main, of two outstanding factors, to which other causes have been more or less subsidiary.

The first of these is the breaking down of the spirit of insularity which, up to and throughout the mid-Victorian period, placed English park design in a class by itself, and tacitly assumed that needs, aims, and practical requirements in this country were so entirely different from those elsewhere, as to make it quite impossible that we should learn anything by comparison of our own methods and results with those to be seen in Continental or other examples.

That this attitude of mind was not quite so foolish as might at first glance appear, will be evident when we consider the enormous influence which climate and national habits have on park design. In this "*green and pleasant land*" it is more often a case of preserving and enhancing the beauty which Nature has provided with lavish hand than causing the wilderness to blossom. For instance, the addition of a little rockwork and the working of a stream into limpid pools and falls is often all that is necessary to produce a better effect than could have been obtained by any other means. Unfortunately, such instances, beautiful and successful in themselves, blinded the eyes of many people to the fact that landscape architecture was more than this would imply, and so began the absurd and pedantic application of such rules as that "Nature abhors a straight line," coupled with a state of mind which confused ingenuity and art and so produced *bizarre* and crude effects in carpet bedding and similar extravagances.

That the absurdity of this attempt to imitate Nature and call it art was not at once apparent was doubtless due to the feeling that, while we might not have been as successful as we should be in the design of the general run of our public parks and gardens, we were nevertheless engaged upon the great task of building up a national style, and a school of park and garden design which would be, when it emerged, particularly suited to the genius of our race and to our climate and ideals, and thus would form a very precious national possession. Doubtless sufficient work of a creditable nature emerged to give colour to this idea, but when we view the results as a whole, and realize what were the effects of the wholesale application of the rules which resulted more or less logically from this attempt to imitate Nature, it becomes abundantly clear that park design had got into a *cul-de-sac* from which it would be impossible to rescue it without a clean break with tradition, and the introduction of new ideas and ideals.

Another result of this false reasoning was, as I have already hinted, the depreciation of the profession of landscape architecture. If the highest art existed merely in the imitation of Nature, surely what was needed in the designer was not a highly trained and specialized artistic sense, but merely a higher development of the imitative faculty. The result has been, in this country, that public park design has been in the hands of those whose only claim to recognition as exponents of the art was their accessibility at the moment, or familiarity with arboriculture or engineering work. Too often our parks have been the prey of the first man on the job.

I do not mean to say that in the design of our English parks we should ignore natural beauty. This would be to go to the opposite extreme. Often the landscape architect's happiest effects are gained by some slight manipulation of that which is already on the site, and which his trained eye shows at once to be a precious possession in the rough, only needing some little manipulation to reveal its beauties.

I have in mind a place where a very ordinary and scrubby plantation was seized upon and converted into a thing of beauty merely by the opening up of a grassy glade through its tangled masses. Another rather striking case is to be seen at Kearsney Court, near Dover. Until we were called in, the damp, undrainable and somewhat dismal hollow out of which a beautiful canal was made, was considered to be such a useless eyesore that its inclusion in the scheme of which it forms a part was never dreamed of. But notwithstanding such telling examples, of which very many must occur in the practice of every landscape architect, the broad fact remains that no art, and least of all his art, can ever exist in the mere imitation of nature or anything else, if only from the obvious fact that a copy can never reach, much less excel, the artistic charm of that which it imitates.

But, as said at the beginning, a second great and fundamental factor has operated to bring about the change in our attitude to park design which has so markedly taken place in recent years. It arises from the manner in which all our methods of life and social habits have changed during that period, and with this change has come a corresponding change in our ideals of park design.

Fifty years ago, almost the only function of such games as tennis and bowls, particularly the former, was to provide, in common with *al fresco* tea, the setting of a social occasion for a very limited middle-class of society. To-day they are played by all classes for their own sake. The result is that, whereas until recently "tennis" meant a desultory game on the vicarage lawn, it now means a particularly strenuous one in every public park. The game, in common with every other form of outdoor sport, has been democratized and has thus completely revolutionized all our ideas of park design.

This same great change may be looked at from another point of view. Fifty years ago the function of the public park was to provide a substitute for that contact with nature of which the urban dweller was necessarily robbed, and the results at their best were undoubtedly successful up to a point. To-day, on the other hand, with the extended means of transport available, bringing almost everyone rapidly and easily into direct contact with nature at its best, the imitation palls and is seen for what it is.

To-day our task is not to provide a substitute for nature but to clothe what is, at bottom, a utilitarian project with the essentials of beauty without sacrifice of usefulness, somewhat in the manner adopted when four little playgrounds were worked into the existing grid-iron lay-out of a Canadian prairie town, for which we were commissioned to prepare a comprehensive scheme along better and more rational lines than existed.

We thus see that two great influences have been at work shaping the modern tendencies of our park design. Firstly, the breaking down of an insular idea which prevented our adopting the best to be found in other countries; and, secondly, the change in our method of living, and correspondingly changed needs which could only be met by a radical change in the methods employed and in our aims in the laying out of our parks. There has, however, been another influence at work which has changed, not so much our methods of design in the individual park, as the whole of our professional practice, enlarging our outlook and rendering our sphere of influence wider and greatly dignifying our profession. This is the coming of systematic and purposeful town-planning, an art as old as the building of cities, but, in its application to English towns, entirely new and revolutionary, and arising out of those Acts of Parliament which have been consolidated in the Town Planning Act, 1925.

Wherever this Act is put into operation under properly qualified control, the first step to be taken is the making of a survey of existing conditions and opportunities. This survey results in what is known as "A User Map"—a plan of the area under treatment—which shows by various signs, colours and methods of shading, the use to which every portion is at present put. This is the invariable custom in my own office, and in every instance the labour of production of such a map has many times over-justified itself.

To explain all the uses to which such a map may be put would be outside the scope of my present subject. The point with which we are concerned at the moment is that the making of an ordinary town-planning scheme and, in particular, the User Map invariably illustrates, in a most graphic and compelling manner, how badly the old, haphazard way of planning our towns has worked—in relation to the provision of open spaces of all kinds. Their distribution, in almost every case, is found to be as chaotic and uneconomic as is possible. (Here was shown a diagram of the existing parks at Bolton, Lancashire.) The diagram shows how very uneven the distribution of open spaces is, and pronounces the curious law whereby the western portion of almost every town is the richest and most aristocratic ; the larger parks are (also as usual) placed where they are least needed.

This method of showing existing open spaces in their isolation is not fair from two points of view. It does not show the relationship of these spaces to the built-up area, nor does it indicate how a properly organized park system can be secured for the town out of the material available. With regard to the first, a map helps to show that, across the two largest parks stretching right into the heart of the town from the west, there is an almost unbroken tract of open country, and we proposed to provide a very necessary radial traffic route across this area without in any way lessening its amenities as a park area.

With regard to the second, I can think of few places where opportunities for the reclamation of lost beauty are so many and so generally well arranged as in this black centre of the Lancashire cotton area. The whole town is surrounded by a series of water-worn ravines, locally known as " cloughs," but, unfortunately, so used are the townspeople to these features in their deteriorated and denuded state that they are quite unable to see what an asset they might be. It therefore became an important part of our work for Bolton to weld all these, together with the existing parks, into a comprehensive park system. How this is to be accomplished in detail must occupy our more careful consideration, for there could be nothing which we could study with so great profit if we are to obtain, in the very limited time which remains to us, a knowledge in the round of 'the *Modern Tendencies in Park Design.*

Briefly stated, the construction of a comprehensive park system along modern lines has two parts. First of all, we have to see that every part of the area under review is provided with its proper quota of parkland and open space, or if this is not possible, either for financial or other reasons, or because the area is as yet too undeveloped to allow of the creation of the whole series, we must still allocate the sites and provide for their retention, free from obstructive developments, until such time as they are wanted under the powers of the Town Planning Acts.

Having done this, having provided each part of the area under consideration with its proper quota of park-lands of various sorts, a further task awaits us in the linking together of these various units into one comprehensive scheme. This was easily accomplished by making use of the cloughs, or ravines, and their conversion into very attractive parkways. In other cases where the nature of the connecting boulevards is not so clearly predetermined by existing facilities, we might have more scope for creative work in the way of boulevards and strips of ornamental parkways, many of which might be contrived so as to help to solve traffic problems without in any way lessening their usefulness or suitability for their main purpose.

We thus see that the first result of the great change in our attitude towards park design, which has resulted from the broadened outlook which town planning has given us, is the introduction of a feature which, while common enough in some other countries, has been so far almost unknown in English practice, that of the connecting parkway or boulevard.

While undoubtedly this class of feature is new to us, it is really strange that it should be, for we are essentially a practical people, and the provision of the connecting parkway is about as obviously practical a proposition as it would be possible to conceive, for by so doing we inevitably increase the usefulness of the parks so connected many times over. It is not so much that people would pass from one park to another along these ways, though this undoubtedly happens, especially when they are provided with riding- or bridle-tracks. Their real usefulness results from the way in which, so to say, the park is brought right to the doorsteps of the populace. Just consider what a difference it must make to the inducement to visit a public park if, instead of traversing ordinary traffic streets all the way to it, one can, in a very short distance, strike across to a parkway which will bring us there along a route which is itself attractive.

But the connecting parkway has two other advantages. Property surrounding a successful public park has usually a very much heightened rateable value, with all that this implies in added attractiveness. Now the making of the narrow strips of parkway naturally extends very considerably the area over which this added amenity and increased rateable value operate and, for a given area, at a very much lessened expenditure, both in capital charges and upkeep, as compared with the park itself. Again there results the enormous advantage that children, the aged, and the infirm and convalescent, the very classes, in fact, for which the public park can do most, are able to reach it without danger from traffic. We are not dealing at the moment, of course, with children's playgrounds, but may incidentally mention that, in a properly conceived and executed scheme, the connecting parkway would again serve the added purpose of linking up these as well as the public parks.

We thus see that, as I said before, the study of the parks and open spaces of a city or town *as a whole*, instead of *individually* and almost apart from their surroundings, as was the bad old way, has not only given my profession a new and enlarged outlook but has brought along in its train quite a number of very practical collateral advantages. In particular, wherever it has been properly and intelligently applied, it has raised the status of practically all the suburban property and affected such an increase in the rateable value of a good deal of it as to make work, on a very extended scale along these lines, a sound business proposition. From the health point of view, too, the results are most marked, the parkways providing air-ducts and sun-traps of a most efficient kind.

It would be most interesting to throw on to the screen plans of all of the park systems on which my firm have been engaged during recent years, and discuss them in detail, but, unfortunately, time forbids, and I must be content with bare mention of two of the most interesting and important, those for Athens and Salonika. I may, perhaps, just explain that our task at Athens was to provide for the much enlarged needs of a modern capital city which recent political changes had rendered necessary, without in any way interfering with its unique and world-famous architectural and sculptural remains. On the contrary, it was a part of our task to allow for the freeing of fresh sites for excavation. While, therefore, the provision of a proper park system was, as usual, only one aspect of a scheme of unusual importance and complexity, it nevertheless had a larger relative place in our plans and report than it might have done in some other cases. The plan of Salonika must, I fear from lack of time, be left, and I can only say that a continuous ring of park and open spaces surrounds the commercial centre of the city.

Now a few words as to the theory of park system design. Most of the opportunities for the creation of park systems which have occurred on the continent of Europe have been provided by the presence of obsolete fortifications, the replacement of which by a ring of parks has been a comparatively simple matter. The Burgring at Vienna is one of the best-known instances of this.

There are three systems, of which the first is the " Ringstrasse," so called from the fact that the removal of the fortifications from around ancient German towns has provided the best opportunities for its creation. It consists of the retention of a belt of country immediately on the outskirts of an existing town, for park purposes, leaving development to skip this belt and proceed, as before, outside it. The second method is the " radial," and it is claimed for this that it is superior to the " Ringstrasse " in two ways. As will be seen, it consists in a series of wedge-shaped reservations, the point of the wedge being as near to the centre of the town as possible, and the body broadening out as it proceeds to the suburbs and open country. It is claimed that this form of park system encourages the flow of fresh air from the open country into the heart of the town, and, further, as the town grows, its expanding wedge shape will maintain the ideal proportions of open space to built-up area. While the town is small and every part is in touch with abundant open country, the thin points of the wedge will provide, probably in the form of small town gardens, all the open space which is necessary; then, as the town spreads outwards, the thicker portions of the wedge will be utilized, giving an ever-increasing proportion of open space to the built area, which is as it should be.

In passing, I should perhaps explain that I am, of course, aware of the rule which has been laid down that there should be, in every town, one acre of open space to every two hundred and fifty inhabitants, but obviously, while such a rule may be suitable for application in quite a large number of cases, there will be others where to apply it in a hard and fast manner would be absurd. This is where the wedge system of planning will score.

But, it may be objected, you are now advocating a system of park development the very reverse of what you have previously championed. The connexion of a series of public parks by a system of parkways or boulevards partakes much more nearly of the "Ringstrasse" system than of the "wedge" system. This may be true, but I have not finished. There is a combination of both systems which, properly applied, can be so planned as to present the advantages of both and the disadvantages of neither.

This combination of the radial and the Ringstrasse systems is the one which would usually be advocated. Strict honesty, however, compels one to admit that, so far as practice in this country is concerned, one has very little choice in the matter, the form which existing developments have assumed having largely taken the matter out of our hands.

In the middle of most towns we have the old congested centre which may, at one time, have been fortified, and round this areas representing the more recent developments. As will be seen—and as is universally recognized to be the invariable result—these areas line both sides of the main arterial roads leading out into the country and to other towns, leaving the intervening areas practically free from permanent developments but, more often than not, in a very untidy and neglected state. Here then we have, ready to hand, the very form of development most suitable for the creation of a "combined" park system. These belts of open country, roughly wedge-shaped in form, which are left between the straggling suburbs, will provide ample room for radial parkways, and at their outer extremities for the creation of public parks of considerable extent, connected by Ringstrasse parkways crossing the main arterial roads with their bordering development, at points where there are breaks in the latter.

But, it may be objected once more, you are again advocating that "ribbon" development which modern practice condemns! My reply is, I am not doing so. I am finding a use and a remedy for it! It must again be obvious that the creation of such a park system as I have described, or merely the earmarking of the land for such a system under the powers of the Town Planning Acts, must necessarily result in the filling in of the gaps between the ribbon development in a manner which will be, at the same time, more inevitable and natural than any amount of town-planning control and regulation could bring about, and of the best possible class to be expected in each individual set of circumstances. The result is that the area available is used in the most economical manner possible. Those portions least suitable for housing development are the ones which make the most attractive and satisfactory park areas, and it is sometimes amazing the amount of such derelict land there is ready to hand. Inevitably its artistic development results in rapid commercial development of the neighbouring and surrounding building land and a rapid accession of rateable value.

Having described as clearly as our time permits the nature of a park system and still more briefly and sketchily its application to a modern English town, the question remains : What forms of park and open space should find a place in such a system ? This is an inevitable but at the same time a most difficult question to answer— an answer which shall be of general application, because the circumstances of each individual town must rigidly control our practice. In most instances we find nearest to the centre of the town what answers to the thin point of our radial wedge, viz. town squares, small formal town gardens, converted graveyards, and small recreational parks. As we proceed away from the centre these will give place to the larger recreation parks and the scenic or promenade parks, together with their connecting parkways and park strips ; then finally the natural reservations and common lands, left more or less in their primitive state.

Other forms of open space will be found in individual and special cases in almost endless variety, of which the most usual will be zoological parks with their " Mappin " terraces, arboretums, great national reservations, exceptional view-points, such as hill-tops, and at the other extreme, land too low-lying for building upon, which, from its very nature in close proximity to streams and lakes, possesses exceptional artistic charm. Sites of antiquarian or historical interest form another obvious class of a differing kind.

At the seaside, again, we shall find another set of public open spaces peculiar to them, such as cliff promenades, sun terraces, shelter gardens, day bungalow colonies, pleasure piers, music pavilions and their grounds—all features which allow of interesting development—fair grounds, items sometimes quite inevitable but which need most careful site-planning if they are not to ruin everything else.

Such are some of the most usual forms which the components of a well-equipped park system will take, and clearly it is quite impossible to deal with any one of them at all adequately in the course of one short lecture. What I would rather do, with your permission, is to confine myself for the remainder of the limited time to a rapid review of some of the more unusual or more modern developments of the series.

The first of these is the great National Reservation, concerning which, under the Regional Surveys, we are hearing more than ever before. In other and newer countries such reservations may be obtained in a manner and with an ease which is impossible here, and may in consequence form a definite part of such park systems as that for Boston. Similar cases may arise as time goes on in this country, but, as a rule, if any sort of a definite physical connexion between the general park system and these very special features is obtainable, this will be about as much as we can expect.

While everyone is agreed as to the desirability and even the urgent necessity of preserving for posterity large tracts of romantic country of which such a variety exists, but which, under the new conditions as to transport, will speedily be vulgarized if nothing is done, the difficulties in the way, largely financial, are very great and real. Occasionally a very wealthy benefactor can help, as did the late Lord Leverhulme, who gave a large tract known as Rivington Park to his native town of Bolton, and in connexion with which we were consulted in the making of the roads, which were all that should or could be done to adapt it to its new use without defeating the very purpose for which it was reserved.

The National Trust for the Preservation of Places of Interest has done much, and more than ever could have been expected with the means at their disposal. The Ancient Monuments Board has spread over the length and breadth of the land a network of representatives and local committees, the various archaeological societies have done what they could, and the Council for the Preservation of Rural England has done most extensive and useful propaganda work; but when all has been said and done, and each of these agencies has accomplished all in its power, the fringe of the subject has only just been touched, and, unless fresh and more generally applicable methods are found and applied, such as are placed within our reach by the Town Planning Acts, the next twenty years will see the irrecoverable ruin of some of England's most priceless possessions and potential national playgrounds.

It is in the application of the powers provided by the Town Planning Acts that the most likely path of progress towards the creation of great national reservations lies. Under these Acts it is possible to earmark, or " zone," land for definite and special purposes, and one of these is the purpose of a privately owned open space. The effect of such zoning is that while there is no interference with the ownership of the land, it must always be kept as an open space, which really means that its present user must go on in perpetuity, and no building developments of any kind, unconnected with agriculture, will be allowed under ordinary circumstances. This enactment thus places a real power for good into our hands, the extent or limitations of which will not be clearly made out until we have more experience of its application than at present.

The large, natural reservations of which I have been speaking will usually come somewhat outside the scope of the ordinary park systems, and at the other extreme in park design we have another feature, the children's playground, which must also be considered somewhat apart from it, simply because the playgrounds of each town or city should form a complete system or network of their own. Again, the User Map, which I described a short time ago, will help us. A circle with a radius of a quarter of a mile is drawn round every existing playground, and any portion of the area which is not included within one or more of these circles is assumed to be without its proper proportion of playgrounds for little children. The reason is obvious. The boy without a playground is father to the man without a job. No child should be without a playground within a quarter of a mile from his home, or it will be useless to him—anyway, in the case of the very little children who should most rigidly be kept off the streets. But even then, when we have completed such a systematic diagram, our task is not complete, for it is also another essential condition that no child, to reach his playground, should have to cross, or even to traverse, a busy main arterial street. I am aware that the latter condition is rather a "counsel of perfection," which may not always be fully attainable; still it should never be lost sight of, and its attainment, or even its substantial attainment, is worth much hard thinking over the drafting board and on the ground, as well as some sacrifice of efficiency in other directions.

The subject of the planning of playgrounds is a most fascinating one, and one which in itself deserves and ought to receive a full course of lectures. It is, however, quite impossible to treat of it fully on this occasion, but there is one aspect of the subject which must be mentioned, and advocated with all the force of which I am capable, not only for its own sake but also because a lecture on modern tendencies in park design would be most incomplete without it. This is the tendency to give to the design of children's playgrounds an aesthetic setting to which in the past they have been complete strangers. I must say, however, that abroad, and particularly in the United States and Canada, this tendency is well to the fore and has reached a high state of development, while in this country it has hardly begun. In my work on the American continent I have always found a ready response to my plea for beauty in the playground, but here it is always assumed to be impractical, and until we have succeeded in creating sufficient good examples to show that this is not so, it is to be feared that progress will be slow.

This question of amenity would seem so very obvious that I find a great difficulty in understanding how it is that its essential practicability is not seen by everyone. A margin of trees, a neat railing on a plain kerb, and a flush pavement surrounding the gravelled area at the point where most wear would come, on which the children may run their small trucks, and so on, are all that is necessary to convert what would otherwise be a wilderness of red shale into a very pleasant spot indeed. Why are we in this country so backward in this matter? It is not too much to say that three-quarters of the play areas in the larger towns are mere dismal voids of red shale or even worse—black cinders. Very little expense in either formation or upkeep might produce an oasis which would charm the eye as well as provide the children with a playground, which would create the impression (at the most impressionable age) that we cared for their social, mental, and moral development as much as their physical. And the same thing applies to school playgrounds.

One stock argument against the provision of an aesthetic arrangement in children's playgrounds is that the spirit of mischief will wreak its destruction. I have given careful attention to this point both here and in America, and have found invariably that acts of vandalism on the part of individuals were always condemned by the majority, and so, even though at first small replacements might be necessary, before long a real spirit of good citizenship among the children grows up, which takes a pride in protecting that which is provided for the enjoyment of others, and thus a double gain is achieved.

Another form of open space, calling for the services of the landscape architect, which will not find its way into the average park system is the seaside promenade. This is a feature which partakes of many and various forms, and one which ought to have a whole series of lectures to itself; in fact, my brother and I have recently lectured at many seaside resorts on the subject as well as undertaking some important constructional work.

Planning at the seaside must necessarily differ from that of an inland town from the fact that the approach from one side is definitely cut off by the sea. [Here was shown a slide which shows very plainly how this affects a radial park system, the promenade works forming the two outermost radials, which will, however, usually differ from the usual form in not expanding and broadening to anything like the same extent as they proceed away from the centre.]

As to the modern tendencies in the design of seaside promenades and pleasure piers, these result from the growing recognition that, while everyone goes to the seaside to bask in the sun, we must be also prepared for those times in the normal English summer when the sun is absent. This means that we must so plan to make the very best of both weathers. We must not only provide the wide, open sunny spaces, inviting every ozone-laden breeze, but also the sunk garden open to sun and sheltered from wind; the day bungalow, which may be made the centre of all our holiday activities, rain or shine; and the concert and refreshment pavilion for use in bad weather and the evenings.

In a well-known north-eastern seaside resort upon which I am at work arranging a complete park system, I have as part of the sea-front development combined in one architectural composition sun terraces, outlook gazeebos, shelter gardens, model yacht pool, and band enclosure, with arrangements for both fine and showery weather. It is intended also to remodel what is now a very bad example of mid-Victorian seaside promenade planning in which crude engineering feats and carpet bedding are the most conspicuous features, and to develop in direct relation to them land at the rear recently acquired by the Council.

Here we have two essential features of the up-to-date seaside resort: the building containing the concert-hall, restaurant, and other indoor facilities, and in front, gardens and terraces leading down to that essentially modern feature, the seaside open-air swimming-bath.

At most seaside resorts fifty years ago (and above all others at Blackpool) a bellman paraded the sea-front at a certain hour, throughout the season, ringing his bell that all males might retire in order that the ladies might have an opportunity to bathe in thick serge gowns with skirts reaching to their ankles. It is because we have only just succeeded in emancipating ourselves from this ancient custom that the provision of open-air swimming-baths on a large and elaborate scale can be described as a *modern tendency.* I do not mean that we have not had some such features with us for twenty years and more. We have, of course; but the idea that we must have one at every up-to-date seaside resort and in every recreational park is essentially new.

It is not always realized what a large income may be derived in connexion with open-air swimming-baths if they are so designed as to attract spectators as well as bathers. No scene could present more vividly the spirit of *joie de vivre* than this—the efficient high-divers, the ordinary swimmers, the mere splashers falling off the floating, wooden horse, and the little children scrambling into and out of the water amidst cheerful laughter, all combine to make a lively scene which the public are only too ready to pay to see, especially when music and refreshments are provided for them in a really attractive manner.

Next to the promenade comes the recreation or scenic park at a seaside resort. Here are we up against a regularly recurring difficulty, of which I should like, if possible, to dispose once and for all. Hitherto there has been a feeling (which, however, is rapidly disappearing through the results obtained) that the provision of a public park in a seaside town is likely to conflict with the claims of the sea-front. "The promenade and sands are our park, we want no other," says the objector, and he further goes on to argue that, with the boundless ocean knocking at his door and broad stretches of open beach before him, any of the usual features of a public park must necessarily look poor and mean by comparison. That nothing of the sort need happen may be proved by a comparison with St. James's Park, London.

Is there any clashing, practically or in aesthetic sentiment,.between the River Thames, with its wide-flung vistas, and the narrow compass and restricted area of the lake in St. James's Park, only a stone's throw away? Of course not, nor need there be in other cases, if properly placed and planned.

An instance is the Blackpool Stanley Park, the success of which has been assured from the very first day of its opening notwithstanding the exceptional variety of counter-attractions provided by the town, which have indeed benefited from the added attractiveness which the new park has given. This park has within its boundaries an 18-hole golf-course, putting course, pitch and put course, 6 bowling-greens, 36 hard tennis courts as well as a number of grass courts, 14 football fields, 2 cricket grounds (one a county ground with a seating capacity of upwards of 20,000), boating lake, sports field, ornamental gardens, and last, but probably as important or more so than any other feature, a large nursery, with a complete range of glass-houses for both propagating and exhibiting purposes, and also a botanical garden.

Practically the whole of the recreational facilities are grouped round one big central area, which I term the social centre, and in which is situated the large restaurant and pavilion serving the whole of the park. The site was for the most part derelict, consisting as it did of brickworks, hen-runs, pig-styes, and the usual caravans.

The most important point to bear in mind in connexion with a park of this kind is that not only does it meet the recreational needs of a very large section of the community, but at the same time produces a very considerable revenue which goes a long way to meeting the interest and sinking fund charged in connexion with its lay-out. Last year alone, when a large number of the games areas were not fully occupied, and with only half the number of boats on the lake which are possible, it produced a revenue of £9,196.

The lake at Blackpool Park is one of the most successful items, judged by financial returns. In the first season, before the motor boats had been purchased, and while the supply of skiffs was yet inadequate to the demand, no less than £94 was taken on boat hire in one day. The bowling-greens, made in a disused clay-pit, have paid their way from the very first, while there are flowers enough there to explode the fallacy that plants will not grow with sufficient luxuriance near the sea to make a successful park. The newness of the borders is evident at a glance, but if this can be accomplished the first season under the exceptionally difficult conditions prevailing at Blackpool, success is possible anywhere under expert guidance. The great thing is to plan from the first for shelter, using every possible device for this purpose.

Another recreational park of a similar nature, only on much more difficult ground, is that at present being constructed to my designs at Plymouth, and here again I have tried to combine the picturesque with the practical.

Still another seaside park, on a very much smaller scale, is exceptionally interesting. This is the small area known as the Winter Gardens at Weston-super-Mare. Shelter has been obtained, first by the building of a pavilion and supporting colonnades along the seaward side of the ground, and by the provision of pergolas enclosing a lily pond, and finally by specially attractive terracing between the putting course and the formal gardens fronting on to the shops of High Street.

This plan brings out also another important point. Under the more formal methods of planning which are such a marked tendency of modern park design, it is quite surprising what a variety of features can be provided within a very restricted area—in this case it was only some four acres—if only the planning is done with an eye to artistic effect, whilst compassing appreciated practical matters.

Turning now to the grounds themselves, there is a lily pond flanked on either side by hard tennis courts; the success of the roses and other climbing plants with which the flanking pergolas are now almost entirely covered is phenomenal. The formal gardens face the main shopping street of the town, and behind the handsome and elaborate terrace walls is the putting course, which has proved a most attractive feature, as well as paying for the whole of the upkeep of the gardens.

I have dealt rather fully with this little scheme partly because I am anxious that it should be clear what a great deal can be done in a small space, without any apparent cramping or confusion, but also because it illustrates, very clearly indeed, another tendency of modern park design. This is the way in which the modern park may be made to pay for itself without in any way suffering practically or aesthetically.

Take the case we have just been considering, for instance. Although the pavilion has only been in use for two seasons and the end of a previous one, the gross amount taken there to date is £20,817 13s. up to and including the 15th of October 1928. For the full two seasons it has been open, the little putting course has taken each year well over £900, and during the season just over, has brought in £1,035 gross. The tennis lawns have averaged about half this sum, until this season, when the gross takings have reached £433, while the income from chair hire, which is doubtless much increased by the presence of the tennis lawns and rose gardens, has been this year £192.

I feel I have only just touched the bare fringe, in casual manner, of what is really far too big a subject for one lecture. I trust that you will consider that I have followed the right course in dealing only with the more specialized and unusual forms of park and public garden design, rather than by trying to say a little about every possible variety. But before I close I must mention two further subjects. The first is what our American friends call the "Passing-Through Park." There are many occasions where we could bring a little brightness and at least a fleeting vision of flowers and foliage into the lives of busy men and women if only we could bring ourselves to depart from our insular and absurd custom of surrounding our parks and gardens with forbidding-looking railings and a thick mass of shrubbery, which appears to be planted with the express idea of shutting off all sight of the gardens from the passer-by. Time after time in my English practice I have advocated the taking of traffic across an open space, either in the form of an artistically designed boulevard or a footpath, and almost without exception my proposals have been turned down, notwithstanding that I have quoted those very successful instances where such an arrangement has been absolutely forced upon us, as in the case of the road which crosses the Serpentine by the bridge in Hyde Park, or similar footways.

In Northampton, for instance, a main traffic artery stretches from east to west, right across the town, except for one or two little connecting links which I proposed to the Council should be provided. The most important of these missing connexions is across the playing fields known as Cow Meadow, where the through route is diverted to go round it. The deflected portion is both steep and narrow, while at one point the combination of changing grades and converging roadways makes a very awkward traffic point indeed. To obviate both the detour and the dangers involved I suggested to the Council that a boulevard should run across the meadow, the remainder of the area being laid out for games, etc., on the more intensive plan we adopt nowadays, thus killing two birds (or rather three !) with one stone, solving a very awkward traffic problem.

And now to sum up. What do we find to be the most prominent of the modern tendencies in English park design ?

First of all we find a greater cosmopolitanism—a greater readiness to study and adopt all in the work of other nations which is translatable into terms of the British psychology and the English climate, coupled with a widened outlook which renders this process infinitely easier than it would have been twenty years ago.

Secondly, we have more epoch-making social changes than have ever occurred in so short a time in the history of the nation, and these again have brought to pass new needs, no less in park design than in other walks of life. In particular, organized games and outdoor sports of the more active kind have come, in which everybody participates, as opposed to those in which the majority are mere spectators.

Thirdly, the coming of the modern science of town-planning has enormously widened the scope of the landscape architect in two ways. It has encouraged him to visualize the whole of his task in each town or city as a self-contained unit, and secondly it has enabled him to lay his plans far into the future without creating a financial position which is impossible.

Fourthly, we have the new movement out of which has arisen such bodies as the National Trust, the Playing Fields Association, and the local Footpaths Preservation Societies, all of whom must be indebted to the landscape architect to a greater or less degree if their schemes are to realize the greatest of which they are capable.

Fifthly, in these more strenuous and complex, even hectic days, our requirements at holiday resorts, whether inland or at the seaside, have been revolutionized within a period of little more than ten years, and everywhere round our coasts developments are in progress.

Sixthly, I believe we are on the verge of still greater changes which will also broaden our outlook, that many forms of public open-air recreational areas will emerge.

The CHAIRMAN : I am sure you will endorse my wish that we should give a vote of thanks to Mr. MAWSON for the very able lecture that he has given us to-day. It has been particularly interesting to me, because, as you know probably, I am very active in the matter of the Royal Parks of London by virtue of my office, and there are so many things Mr. MAWSON has brought to light to-day which I shall bear in mind. Nobody would be happier than I to see all the railings disappear from the parks, but I am afraid there may be technical difficulties which may make it almost impossible.

I have always worked to keep the various little retreats and squares as little oases for the children of London. I hate to see the poor little things, who have very little happiness in life, playing in the hot asphalt streets when they might have charming green playgrounds.

There is one other matter, and that is, What is the special share for us all to take in preserving the beauty of the countryside generally? I am at the present moment actively engaged as Chairman of the Committee set up by the Home Office to try to arrange with the County Councils and Borough Councils of England, Scotland, and Wales to promote by-laws to protect the countryside from some of the horrible shacks and the petrol stations. It is not only the pumps that are so horrible, it is the surroundings, the sort of corrugated-iron dumps which you find in these beauty spots. It is by no means an easy task, but I have found sympathy from the great Petroleum Companies, and I hope to get some sympathy from the garage-owners who are really the worst offenders. If we can only do something to suppress the horrid blot caused by the pumps that are put down in really delightful spots, then we shall have been able to do something towards the preservation of the beauties of this country.

I hope you will join in expressing our warm appreciation and thanks to Mr. MAWSON for his very able lecture.

Mr. MARK FENWICK: I am sure you would like me to thank Sir Lionel Earle for presiding here to-day. He is a very busy man and we appreciate his presence very much. You know, no doubt, that he, in conjunction with Mr. Hay, is responsible for the very beautiful bedding out of the parks. I think I may say he has very little to learn in the way of gardening; and I would like on your behalf and on behalf of the Council of the Royal Horticultural Society to propose a very hearty vote of thanks to Sir Lionel Earle for presiding over this meeting this morning.

The CHAIRMAN: I am deeply gratified at this kind appreciation. I esteem it a very great pleasure to be here, and I am delighted to see the Royal Horticultural Society extending its activities in this way.

XII.—GARDEN DESIGN IN CANADA.

By H. B. DUNINGTON-GRUBB.

SEVENTEEN years ago I found myself asking a friend in London to give me his opinion regarding the prospects of making a living in Canada as a garden designer. "You are proposing to emigrate fifty years too soon," was his answer. Four months of travel through the Dominion, staying a week or more in every principal city, was more than sufficient to convince me of the soundness of my friend's judgment.

Pioneering in Canada to-day still means the conquest of savage nature for the garden designer, although forests are cleared and wolves driven back to their northern wilds. A leading Canadian architect announced that no garden was so beautiful as trees and grass. One of Canada's most celebrated bankers, a most cultured, public-spirited man, art patron and critic, informed me that the Canadian public possessed such appreciation of the beauties of wild nature that garden design was likely to make very little headway.

I well remember an interview on a very hot August afternoon during the progress of the work on the gardens for the palatial Government House for the Province of Ontario. The Minister of Public Works had some excuse for being brusque. After inspecting stonemasons setting balustrade, cut-stone fountains, pavements, and steps for the terraces, he controlled himself sufficiently to merely ask if these things were necessary. The only possible answer was to admit quite frankly that they were all wholly unnecessary, that we were dealing, unfortunately, not in necessities, but in luxuries, and that the only really necessary work involved was a plank walk to the front door so that people could get in and out of the building without stepping in the mud. Garden design in a country devoid of gardens must necessarily be a gradual evolution. One does not look for much in the way of serious artistic convictions amongst captains of commerce. It was, therefore, rather refreshing to be told, on presentation of garden plans for a cut-stone Georgian mansion, that the garden must be so wild that a wild beast would feel at home in it. In an almost involuntary aside something was murmured about "anxiety to make a gentleman feel at home." When it eventually turned out that his wife had caught the word "gentleman" the invaluable lesson was learned that, although repartee makes reading lively, it also makes business dull.

Canada may still be said to be in a transitional stage between the pioneering frontier life of yesterday and the highly industrialized civilization which is now developing so rapidly. Hand in hand with the industrialization of the country we see a simple society developing in complexity. With the gradual accumulation of wealth the arts begin to flourish and a luxury-loving class begins to emerge. Wealth and leisure, with the opportunities they afford for foreign travel, are having their effect on the generation now taking the lead in society, in business, and even in politics. Whereas twenty-five years ago music had scarcely made its appearance, Toronto is now well known on the American continent as a musical centre. A quarter of a century ago the born Canadian with talent for art, music, or literature usually emigrated to a country where his talents were appreciated. He now more frequently finds his opportunities at home. A school of young native-born architects is beginning to produce buildings, both public and private, which combine the virility of the best American architecture with the traditions of the Old Land.

In all civilizations gardening has been the last of the arts to bloom. Bacon's remark that "man learns to build stately sooner than to garden finely" is nowhere better illustrated than in the Western Hemisphere. In a simple society democratic urban life is expressed in the living conditions of the individuals composing that society, all of whom are on more or less intimate terms socially. In such a community privacy is not considered a desirable objective when planning either house or garden. The result is a house with its wide verandah close to the street so that both family and visitors can see, and be seen by every passer-by, either on wheels or on foot. In such communities gardening, in the strict sense of the word, which actually means enclosure, is almost impossible. As communities grow in size and wealth, differentiation begins to appear. Mrs. Jones no longer knows her neighbour Mrs. Brown. It is difficult for her to be "not at home" when every part of house and garden are in full view of the street. Custom and tradition may resist the demand for seclusion for a time, but eventually the wall or dense boundary plantation will appear. I was once present at an interview when the architect's plan for a new, large house was presented to a millionaire of very recent arrival. The dismay of the client's wife was immediately apparent. "Where is the front verandah?" she demanded. "We always sit in our 'rockers' on the front porch in the evening and watch the motors." The transitional stage is well illustrated in Delaware Avenue, Buffalo, where a double row of stone palaces lines each side of the street like public buildings, receiving protection from the gaze of the public only by the distance they are placed back from the sidewalk. From the point of view of the public this transitional fashion is satisfactory, as the street passes through what appears to be a great open public park. No device is used to mark the boundary between public and private land. Grass and trees sweep up to, and frequently round, the buildings, rendering the grounds quite useless for social or family life. Such streets become the showplace and the pride of the city. Public opinion refuses to permit enclosure. When the women rebel and demand privacy the only alternative is the country estate. In a still more complex society such as is found in the suburbs round Philadelphia, the streets resemble those of a wealthy English suburb. High walls, or a retaining wall surmounted by a hedge, invariably mark the boundary. Little more is seen of the house than the chimneys. When this stage is reached gardening begins to flourish. Garden design in its traditional sense means a continuation of the rooms of the house out of doors. Real gardens must be designed for use. In the absence of seclusion this is impossible as far as private gardening is concerned.

The comparatively slow progress made by garden design in Canada is due to a number of causes. In the first place, the scarcity of trained designers is undoubtedly responsible for lack of interest on the part of the public. Proof of this lies in the fact that appreciation has greeted almost every successful attempt when a competent designer has been given an opportunity of expressing himself. In almost every such case a handsome offer has been made to the owner for both house and garden by people who have lacked sufficient imagination to realize that their own property could be developed in quite as attractive a manner for a fraction of the price offered. England has sent to Canada trained designers and craftsmen in almost every art and craft except that of gardening. No school exists either in England or Canada for the effective training of garden designers. If neither country trains men capable of creating a demand for gardens in Canada, that demand will ultimately appear without them. It will eventually be satisfied by students trained in American schools of landscape architecture, to the detriment of the English tradition in this Dominion. In the second place wealth tends to be concentrated in the hands of people with little education or culture. Having started from poverty such people have had little opportunity of developing sufficient philosophy to enable them to know how to make use of the money which has cost them a lifetime of hard work to obtain. It then becomes largely a question of fashion. They spend their money as they see their neighbours spending it. It is not unusual to find twenty-five thousand dollars' worth of automobiles in the garage, a similar amount spent on rugs and furniture in the living rooms, and one thousand dollars considered an extravagance when contemplating a garden. In the third place we have the question of fashion in garden design. Situated between the United States and the United Kingdom, Canadians obtain their ideas of what a garden should be from both countries. As most Canadians see much more of American than of English life, it is perhaps only natural that American ideals should have their influence on thought in this country. In the United States a very powerful school of landscape design has made its appearance during the past fifty years. Many of the Universities possess schools of landscape architecture devoting a full four-years' academic course to the subject, culminating with a degree. Whereas in Canada and England garden design is largely in the hands of amateurs, the United States is in possession of a highly educated class of professional designers who are certainly making their influence felt over the whole continent. Having received their original inspiration from the English Landscape School and using Sir Humphry Repton as guide, they have been the cause of much confusion of thought as regards garden design on the part of the general public. Gardening for naturalistic effect has been held up as the ideal not only for the extensive public and private park, but also for the smallest villa garden. A lawn, a few clumps of shrubs, and the inevitable sprinkling of shade trees are still considered better taste, by the average householder, than the designed garden. This style has the advantage of demanding little in the way of training or ability on the part of those who are called upon to execute it on a small scale. For the vast majority, who have little interest in gardening, it provides an easy solution of the problem of the home grounds both as to lay-out and maintenance. In the absence of skilled gardeners, maintenance presents the major problem of most gardens in this country. Climate cannot be blamed for lack of interest in Canadian gardens. The only group of planting material which visitors from Europe really miss is the broad-leaved evergreens. If most of our plantations are deciduous, or perennial, in character, we have a large selection of conifers which are constantly increasing in popularity for winter effect. A gardening season of seven months is sufficient to make gardening worth while.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LIV.—On the Effect of Length of Daily Period of Illumination upon the Growth of Plants.

By M. A. H. Tincker, M.A., Keeper of the Laboratory, Wisley.

The regularity with which species produce their blossoms within a comparatively narrow range of time year after year, despite minor fluctuations due to varying temperature, rainfall, and other meteorological conditions, has often been regarded as a manifestation of rhythm in nature, characteristic of regions other than the tropics. During recent years much progress has been made as a result of careful investigations towards elucidating this phenomenon of periodicity.

One important step forward was made some ten years ago by Garner and Allard [17].* These workers exposed plants to various periods of daylight and found that species reacted to this treatment in a decidedly interesting manner. When subjected to short days some species (Soy-beans) produced flowers whilst still remarkably small plants, others produced flowers only when the daily period of light was of long duration. They were also able to control vegetative growth by manipulating this factor. Their interesting results quickly attracted the attention of workers in other countries. Adams [1], Gilbert [24], Eaton [14], and others confirmed their observations in America and Canada. From Porto Rico McClelland [43] reported that some species, like *Tephrosia candida,* respond in no uncertain manner to even a slight alteration of the period of illumination.

Previous papers published in other journals have reported the results of experiments carried out at the Welsh Plant Breeding Station [60]. In these experiments the daily period of illumination was reduced to either 6, 9, 10, or 12 hours daylight by running the plants to be tested into darkness in a specially constructed and well-ventilated hut. Generally, the results observed afforded ample confirmation of those of Garner and Allard [17], and added new data obtained by using herbage species. The different response to this treatment shown by various strains, varieties, and "ecotypes" of the same species was one of the most interesting features of these results. It was also observed that curtailing the period of daylight not only greatly influenced the time of flowering, but controlled the habit of growth, the increase in dry weight of the plants, and the utilization of the food products, more especially so in tuber-producing plants. More recent work by others, as, for example, Knott [38] with Soy-beans, has indicated that this effect of light can be strictly localized in one part of the plant so that one branch may produce flowers while the rest of the plant grows vegetatively.

---

* Reference is made by number to the alphabetically arranged bibliography on pp. 376–378.

Other investigators have concentrated their attention upon the changes in microscopic structure of various parts of the plant; PFEIFFER [48] studied modifications in the anatomy of the leaf, PRIESTLEY and REDINGTON [52] report that the production of fibre of economic value can be influenced by the period of light, whilst yet others have studied the chemical relationships of the food products in the tissues as controlled by the length of the day. The work of AUCHTER and HARLEY [6], NIGHTINGALE [46], and GILBERT [25], who employed plants of horticultural importance in their experiments, is of much interest. Their studies indicate that the external form of a plant and its behaviour is closely correlated with its internal chemical composition. SCHAFFNER [57] collected data upon the effect of the length of day on the ratio of the flowers of different sex in maize, and upon the reversal of the sex of the flowers in hemp caused by alterations in the light period.

A review of the subject has been published by KELLERMAN [35].

The present paper forms the third of a major series of reports by the writer dealing with the effect of different periods of light upon the plant growth, and deals with results obtained at the Royal Horticultural Society's Gardens, Wisley, where the investigations have been continued.

THE AIM AND METHOD OF THE EXPERIMENTS.

The plants of the species to be tested were grown in pots; the soil was a satisfactory loam. Generally, the cultural details followed as closely as possible normal horticultural practice. The pots were placed on small trolleys so that they could easily be run into the darkness of a specially constructed hut, designed for the specific purpose, as ventilation was essential and at the same time light had to be excluded. The hut was divided into three sections, in one of which electric light was installed. This equipment consisted of two lamps with reflectors. The type used was the Mazda diffusing unit, frequently employed for industrial lighting and known as the Mazdalux Glassteel diffuser. This unit gives a characteristic distribution curve in which almost all of the light falls within an angle of 60° of the vertical. The lamps employed were rated at 150 watts with a nominal intensity of 157 c.p., and when new gave an intensity of slightly more than that figure. The influence of the diffusing globe was to reduce the mean spherical candle power to approximately 82; the globe possessing an intrinsic brilliancy of 1·28 c.p. (approximate) per square inch. Each of the two lamps was suspended at a height of 7 feet above the trucks on which the plants grown in pots were placed. A practical test indicated that the light intensity at the level of the truck was 1·85 foot candles; that is to say, allowing for the height of the plant pots, the plants received at soil level illumination of an intensity of about 2 foot c.p. A plant 3 feet tall would receive at its tip an intensity of approximately 5 foot candles. The lamps were controlled by an automatic time switch of the Venner pattern. Four series of plants were grown:

(1) Plants exposed to the normal daylight from 1 P.M. to 7 P.M.,* "6-hour" series.

(2) Plants exposed to the natural daylight from 7 A.M. to 7 P.M.,* "12-hour" series.

(3) Plants exposed to the natural daylight from 7 A.M. to 7 P.M.,* after which they received 5 hours electric light, making a total of 17 hours illumination.

(4) Control plants receiving the full daylight, which in May and July amounts to 16 hours (5 A.M. to 9 P.M.*).

From the last three series it was therefore possible to obtain some estimate of the effect of the increased duration of the period of electric light. The intensity of the supplementary light was very low. It was hoped by this means to preclude photosynthesis during this period.

Before considering the results obtained it is necessary to examine the temperature relationships under which the series of plants grew. A maximum-minimum thermometer was placed in each section of the hut and alongside the control series; readings were taken of the maximum, minimum, and actual temperature twice in each 24 hours—when the trucks bearing the plants were run in and out of the hut. The effect of the nightly shelter given to series (2) and (3) was an average increase of 2·5° F. each night for the first two months of May and June, and caused in July and August an average increase of 1·2° F. each night. The effect of the electric light for 5 hours was to raise the minimum temperature by an average of 0·75° F. each night during the months of May and June and to increase the minimum temperature by 0·60° F. in July and August. All the plants received an adequate supply of water throughout the entire period of growth.

THE RESULTS OBTAINED.

The results presented in this paper have not been previously published, and unless otherwise stated were obtained from cultures grown at the Society's Gardens at Wisley. It will perhaps be convenient to present these results in two sections, the first dealing with the effect of short periods of daylight and the second with the use of artificial light. In both sections the results obtained from species exhibiting a similar response are placed together. Plants which flower early under short periods of light have been described as "short-day plants," whilst by a "long-day plant" is meant a species which produces blossoms only under long periods of illumination. The former are dealt with first in each section. The term "photoperiodism" has been coined by the American workers to designate the response

---

* Summer time.

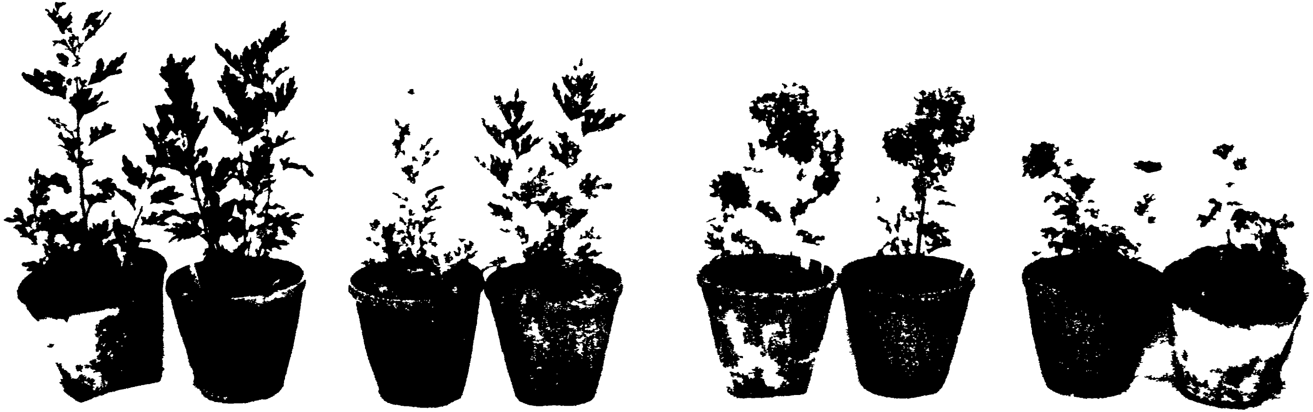


FIG. 128. CHRYSANTHEMUM HORACE MARTIN

A. Control plants in bud. B. Received 12 hrs daylight + 5 hrs electric light. C. Received 12 hrs daylight only; in full bloom. D. Received [illegible] hrs daylight only.

Cuttings made February 8, 1928. Treatment from May 29, 1928. Photographs taken September 11, 1928.

[*To face p.* 356

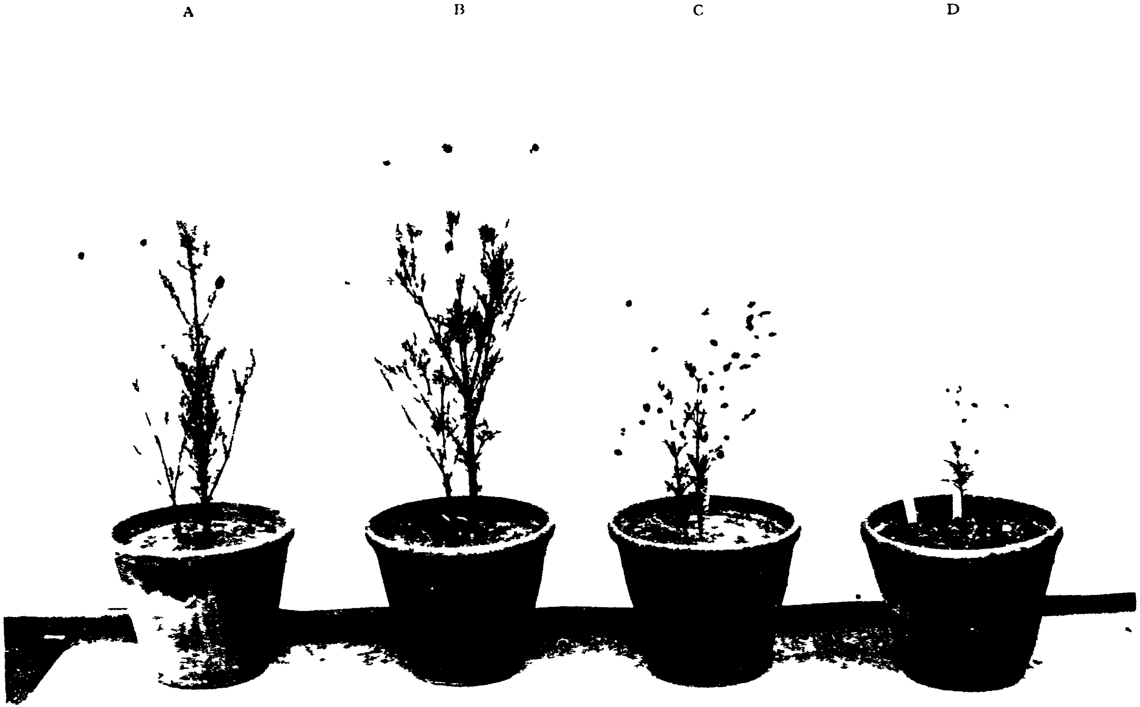


FIG. 12[illegible] COSMOS BIPINNATUS

A. Control plant with few flowers. B. Received 12 hrs. daylight, 5 hrs. electric light, with few flowers. C. Received [illegible] hrs. daylight, with many flowers and ripening fruits. D. Received 6 hrs. daylight.

Seeds taken March [illegible] 1928. Treatment from April 4, 1928. Photographs taken July 14, 1928.

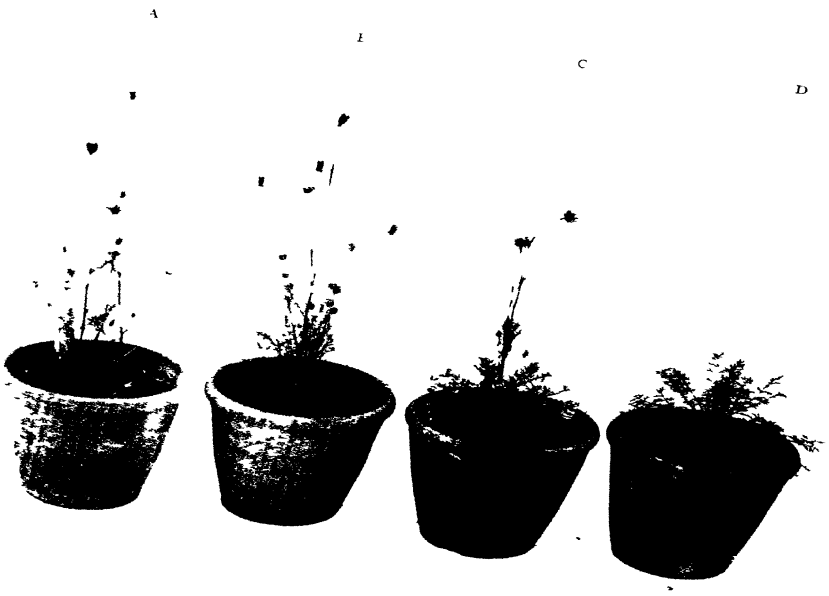


Fig. 156. Nigella damascena

A Control in flower. B Received 12 hrs daylight 3 hrs electric light in flower. C Received 12 hrs daylight in bud. D Received 9 hrs daylight vegetative growth only. Seed sown March 6 1928. Treatment from April 24 1928. Photographs taken September 11 1928.

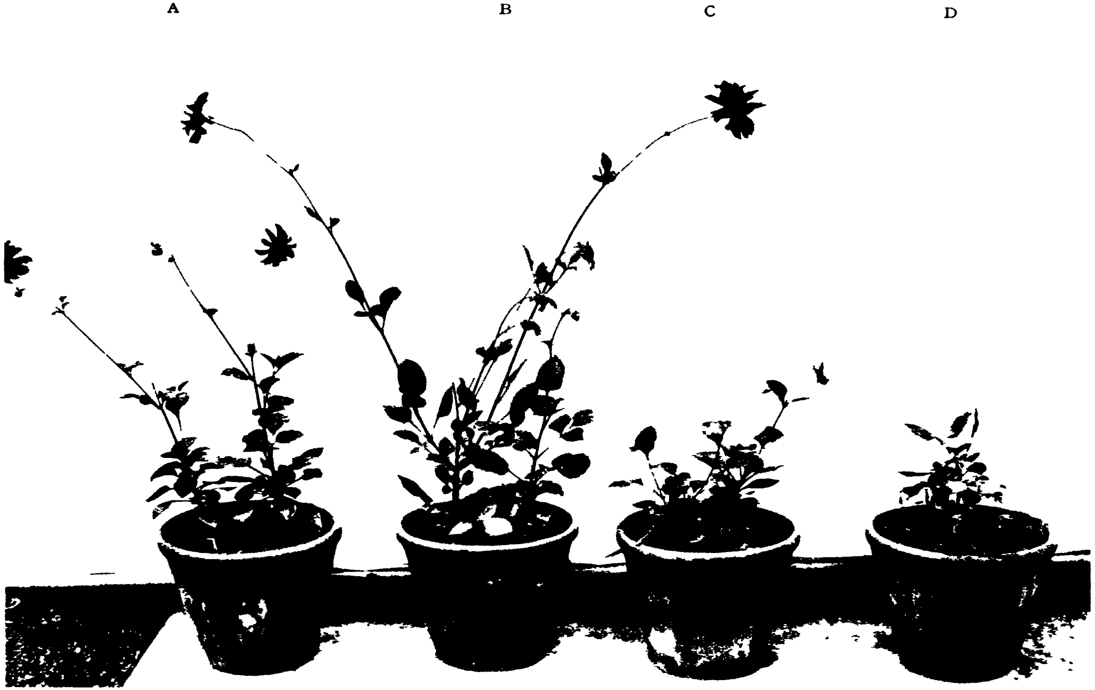


FIG. 151.—DAHLIA 'READING STAR.' Compare fig. 134.

A, Control plant. B, Received 12 hrs. daylight, 5 hrs. electric light. C, Received 12 hrs. daylight.
D, Received 6 hrs. daylight.

Cuttings made March 10, 1928. Treatment from May 20, 1928. Photographs taken August 17, 1928.

[*To face p.* 357.

exhibited by plants to varying periods of daily illumination. One objection to this term is that the response is produced by such a "complex factor," including in its complexity such units as the true duration of the illumination, the intensity of the illumination, and the quality of the light.

(1) RESULTS OBTAINED BY CURTAILING THE DAILY PERIOD OF ILLUMINATION.

A. SHORT-DAY PLANTS.

1. *Chrysanthemums* (fig. 128).—The required number of plants was obtained from cuttings made in February, and taken from somewhat old plants of the yellow variety 'Horace Martin' and the amaranth pink 'Mme. Marie Masse.' The early growth made in spring of the various series was similar; by September, marked differences were apparent. The plants receiving the full daylight were much taller and bore small buds, whereas the plants receiving 6 and 12 hours light had produced a large number of fully developed flowers supported by rather weak stems. The flowers produced by the plants receiving 6 hours daylight were smaller and fewer in number than those of the 12-hour series. The control series receiving the full daylight attained the zenith of their flower production more than 6 weeks later than the 12-hour series

2 *Cosmos bipinnatus* (fig. 129).—Seedlings raised from seed sown in March were subjected to treatment when they had developed two pinnate leaves. The plants receiving 6 and 12 hours daylight did not elongate rapidly, and the former series died in June after producing a few small terminal flowers. The plants receiving the full daylight grew to a height of 60 cm. and carried a few blossoms in summer. On the approach of autumn many flowers were produced. The series receiving 12 hours light a day flowered freely at the end of June.

When plants growing vigorously under the influence of long periods of light were transferred to shorter periods of 6 and 12 hours a day, they produced flower-buds within ten days. The rate of growth was checked by this transference.

B. LONG-DAY PLANTS.

1. *Phacelia campanularia.*—This species was sown in February and the resulting seedlings were subjected to the varying treatments on April 28. Flowering occurred in all series. The vegetative growth of the short-day series remained vigorous for three months after the long-day series had produced seed and died.

2. *Nigella damascena* (fig. 130).—The seedlings raised from seed sown in March were subjected to the varying periods of light in April. The control series showed elongation of the stem and the production of flower-buds in June, whereas the treated series which received only 6 hours and 12 hours daylight remained longer as vegetative rosettes and did not produce any flowers until October. The vegetative

growth and the root production of the plants receiving 12 hours daylight greatly exceeded that of the full daylight series.

3. *Nemophila insignis.*—Results somewhat similar to those given by Phacelia and Nigella were obtained with this species. Seedlings raised from seed sown in March were subjected to the various treatments in April. Whereas the control series produced a large number of flowers on each plant in June, the series of plants receiving short periods of light produced but few flowers, and continued to grow vegetatively for several months after the early-flowering controls died.

4. *Mangel. Ref. No. Db. 7—' Yellow Globe'—and Db. 10—' Yellow Globe'—Aberystwyth.*—Plants subjected to 10 hours daylight produced swollen roots in their first season, as did the controls. The 10-hour series did not produce any tall stems throughout the second season, and during the summer resembled a winter rosette of leaves. Confirmatory results were obtained from a series of very large " roots " grown in the field in the normal way and transplanted in the spring. The control plants produced normal inflorescences in June. No tall erect growth took place in the 10-hour series until the end of August, when slow elongation of the stem began.

5. *Sugar Beet—Ref. No. Ds. 52—Aberystwyth.*—During the first season normal large roots were produced by both the 10-hour and control series. Unlike the mangels, these plants elongated and produced flowers in the second season. The control plants, however, grew taller and the clusters of fruits ripened earlier than those of the treated series.

6. *Kohl Rabi 'Champion Short Top'—Ref. No. Ds. 51—Aberystwyth.* The stems of seedlings subjected to a 10-hour period of daylight did not elongate as quickly as those of control plants, but increased in thickness more rapidly. At the end of the first season the height of the 10-hour series was approximately 5·5 cm., whereas that of the controls was 10 cm. In the second season normal elongation of the stem followed by flower production took place in the 10-hour series.

7. *Swede ' Champion'—Ref. No. Dc. 7—Aberystwyth.*—Seedlings from seed sown in April, when subjected to a 10-hour period of daylight did not grow as vigorously as the control plants. During the spring and summer of the second season, only a few flower-stalks were produced by the treated plants. In a further experiment, large " roots," grown under field conditions during the first season, were transplanted and subjected to an 8-hour day in the second season. These " roots " produced flower-stems, flowers, and fruits at very much the same time as did other " roots," similarly transplanted, which received the full daylight. The flower-stems of the treated plants did not grow nearly as tall as those of the control series.

8. *Turnip 'Hardy Green'—Ref. No. Dd. 11—Aberystwyth.*—Seedlings from seed sown in April when subjected to a 10-hour period of daylight grew normally, and throughout the season the treated plants did not differ markedly from the control plants receiving natural illumination.

9. *Subterranean Clover—Ref. No. Ak. 70—Aberystwyth.*—A small trial with this species indicated that under an 8-hour period of daylight vegetative growth was vigorous. A higher percentage of leaf, as contrasted with stem, was obtained in the treated series. The production of flowers, which was only slightly retarded, followed by geotropic curvature of the inflorescence stalks, and subsequent burial of the ripened seeds, took place in the 8-hour series in the characteristic manner of this biologically interesting species.

10. *Wild Red Clover—Ref. No. Aa. 760—Aberystwyth.*—A series of trials with early-flowering wild red clover demonstrated that flower production is retarded by short periods of daylight. In the early wild type flowering can take place under a shorter period of daylight (i.e. 10 hours) than in late-flowering types, where longer periods (14 hours) are necessary.

11. *Kale—Improved Thousand-headed—Ref. No. Da. 14—Aberystwyth.*—Seedlings raised from seed sown in April subjected to a 10-hour period of daylight, grew in a similar manner to the control plants. After the winter, when again subjected to a 10-hour period of daylight, flowering took place simultaneously with the control plants. The treated and control series were approximately equal in height and total dry weight, but the percentage of dry matter in the control series, 24 per cent., appeared greater than in the treated series, 19·9 per cent.

12. *Kale—Marrow-stemmed—Ref. No. Da. 15—Aberystwyth.*—The plants produced from seed sown in April and May were of a heterogeneous nature morphologically. Generally, there was no significant difference between the control and 10-hour series in time of flower production, in growth in height, and in total dry weight. The control series contained a higher percentage of dry matter than did the 10-hour series.

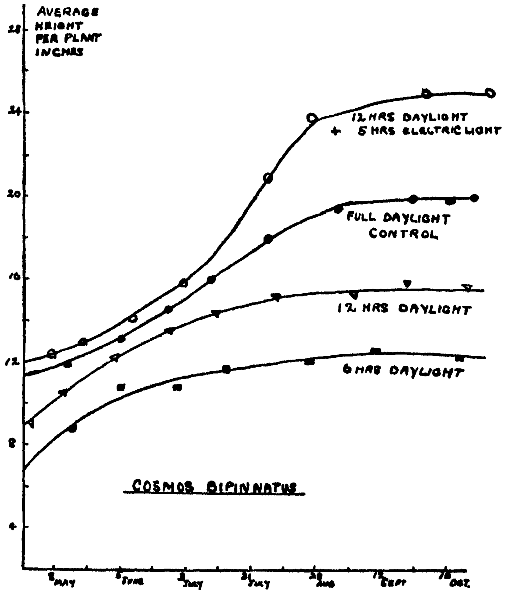
13. *Dahlias—Single Star, 'Gloria' and 'Reading Star'* (fig. 131).—By means of cuttings made in March, a sufficiently large and homogeneous population of plants was obtained. The plants were subjected to the different light treatments on May 29. At the end of June the controls had formed large flower buds, whereas the plants subjected to short periods of daylight had failed to do so.

In Table II (p. 364) the weights of these Dahlias lifted in July and in October are shown. Plants subjected to short periods of light (6 hours) formed few large tubers, whilst the "top" growth (stems and leaf) was limited in size and functioned only for a short time. With 12 hours daylight more food accumulated in the tubers, whilst the top growth was also greater than that of the 6-hour series, but was less than that of the flowering controls which produced few tubers. The results indicate that short periods of light reduce the subaerial growth of the plant and increase the rate at which the carbohydrate food manufactured is transferred to the tubers. The flower production of the 6-hour and 12-hour series was decidedly poor in comparison with that of the control series. Chemical analyses revealed the fact that the plants receiving short periods of light contained a smaller percentage of fibre in the stems than did the controls, the stems of which were of a woody nature. Despite the fact that when lifted the stems of the short-day series showed signs of autumnal withering, they yet contained more nitrogen per unit weight than did the stems of the control series.

(2) RESULTS OBTAINED BY USING ELECTRIC LIGHT.

A. SHORT-DAY PLANTS.

1. *Cosmos bipinnatus* (fig. 129).—The seedlings were raised from seed sown in March, and after transference to suitable pots the various light treatments commenced at the end of April. The plants receiving only 12 hours daylight grew slowly and flowered vigorously in contrast with the controls which elongated rapidly and produced only a small number of flowers on lateral branches. The plants subjected to 12 hours daylight and 5 hours electric light closely resembled the controls in their habit of growth. The growth in height of the series is shown graphically below, from which it is clearly seen that the series receiving 5 hours electric light grew somewhat faster than the control series, and very much more rapidly than the plants receiving short daily periods of light.



2. *Chrysanthemums* (fig. 128).—The varieties tested were again the yellow variety 'Horace Martin' and the amaranth pink variety 'Mdme. Marie Masse.' The requisite number of plants was obtained by taking cuttings in February, and the young plants were first subjected to treatment in April. Briefly, the results indicated that the short periods of light (6 hours and 12 hours) accelerated flower production, whilst the

control series and the plants receiving the electric light grew taller and flowered two months later than the 12-hour series. Again, the electric light had caused the habit of growth to change so that the plants resembled the control series rather than the 12-hour series.

B. LONG-DAY PLANTS.

1. *Phacelia campanularia.*—Seedlings from seed sown in March were subjected to the various treatments at the end of April. The control series and the plants receiving the electric light in addition to the daily period of 12 hours natural illumination functioned as normal ephemerals. The plants of these series closely resembled each other; they contrasted with those plants receiving 12 hours daylight which prolonged their vegetative period of growth for a further period of three months after the control series had produced ripe seed and died.

2. *Nemophila insignis.*—A trial with this species gave results of an entirely similar character to those just described.

3. *Nigella damascena.*—In this case also, seedlings raised from seed sown in March were subjected to the different periods of illumination from the end of April. The plants exposed to the 12-hour period of daylight grew in the form of rosettes, whilst the control series and the plants receiving the additional electric light produced elongated stems in June which bore flowers in July.

In both "short-day" and "long-day" plants the series receiving 17 hours light, five of which was electric light of low intensity, resembled the full-day control plants and differed greatly from the plants receiving 12 hours natural light only. Previous experiments demonstrated that *Phaseolus multiflorus* and *Helianthus tuberosus* were species particularly sensitive to alterations of the daily period of illumination. Experiments with these two species and with one further tuber-bearing species—Dahlia—provide additional data for a consideration of the effect of the length of the period of illumination on the transference of the food products.

C. SPECIES GROWN TO PROVIDE DATA UPON THE UTILIZATION OF THE FOOD PRODUCTS.

1. *Helianthus tuberosus* (fig. 132).—Tubers, as equal in size and weight as possible, were planted at the end of April and the young plants were subjected at once to the different treatments. The series receiving the full natural daylight grew in height rapidly, whilst plants receiving 12 hours daylight grew slowly. The plants exposed to 12 hours daylight and 5 hours electric light resembled the controls. The growth in height of the different series is shown in the graph on p. 362. The top growth of the series receiving 12 hours daylight died early, whereas the plants receiving the electric light continued to grow; although their basal leaves were shed the apical rosette remained green. On October 4 the plants were removed from the

pots and weighed; the data obtained are shown in Table I. The graph and table show that the series of plants receiving 12 hours normal daylight plus 5 hours electric light differ greatly from the series receiving 12 hours daylight, in which rapid production of tubers took place.

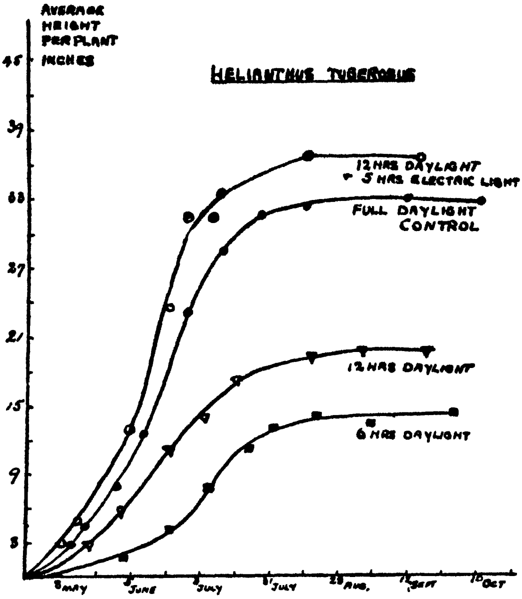


TABLE I.

Showing the weight in grams of top growth and tubers of Artichokes grown under different daily periods of light from May to October.

Hours of daylight.	Average fresh weight of tops.	Average per cent. dry matter.	Average fresh weight of tubers.	Average per cent. dry matter.	Tubers per 100 gms. tops fresh weights.	Height attained in cms.	Dry weight of tops and tubers
6 . .	90·5	22·6	60·2	19·95	66	45	33·5 *
12 . .	27·6	39·8	163·0	20·75	590	60	43·0 †
12 + electric 5	161·5	32·0	120·4	19·9	72	84	76·0 ‡
Full .	124·6	29·7	123·0	20·3	99	79	73·0 §

* Tops quite green. † Tops dead.
‡ Apical rosette green, basal leaves shed.
§ Autumnal withering just commenced when lifted.

2. *Dahlias.*—The varieties grown were 'Gloria' and 'Reading Star,' and are classified as single star types. The young plants were subjected to treatment from the end of April. The series receiving electric light

resembled the control series in appearance. In order to obtain information as to the rate at which tubers were produced, half the series of one variety were removed in July and weighed. The other plants were allowed to grow until October, when they were all removed from the pots and weighed. Table II (p. 364) summarizes the data so obtained. Under 12 hours daylight more carbohydrate accumulated in the numerous tubers, but the top growth was very much less than that of the free-flowering control series. The series receiving electric light grew taller and produced, relatively to their top growth, less weight of tubers than did the 12-hour series. In habit these plants closely resembled the control series. The results indicate that the period of light influenced the rate at which the upward growth of the plant took place. The utilization of the food manufactured was controlled: under short days there was a more rapid production of tubers and the tops soon withered, whilst under long days vegetative growth followed by flower production was normal. The production of tubers per gram. of top growth was very much lower in the control and electric light series than in the 12-hour series (fig. 134).

3. *Phaseolus multiflorus* (fig. 133).—Seed of the variety 'Best of All' was selected by size and weight, and was sown at the beginning of May. Throughout the season the plants grown under short daily periods of illumination remained in the form of low bushes which did not flower, whilst the controls grew rapidly and produced flowers and fruits. It was again observed that under short periods of illumination of 6 and 12 hours duration the carbohydrate food manufactured passed down to the roots which, on becoming secondarily thickened, soon functioned as storage organs. The plants receiving

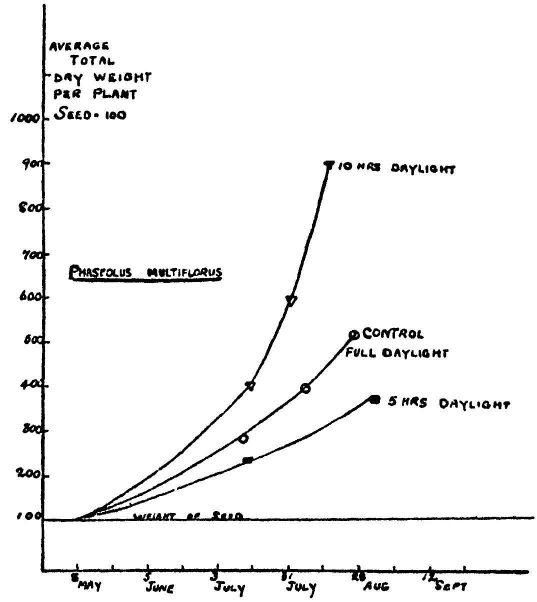


TABLE II.

Showing the weight in grams. of Dahlias grown under different daily periods of light from April.

Variety.	Number of plants involved.	Series period of illumination.	Date.	Average fresh weight of tops.	Per cent. dry matter in tops.	Height in cm.	Average fresh weight of tubers.	Per cent. dry matter in tubers.	Total dry weight recovered	Notes.		
'Gloria'	6	6 hrs.	14/7	15·8		21	31·2			Tubers large, but few.		
	6	12 hrs.	,,	25·6		29	70·8					
	6	12 hrs. and 5 hrs. electric	,,	89·0		36	18·1					
	6	Full daylight	,,	55·0		35	46·1					
'Gloria'	10	6 hrs.	5/10	2·1	30·8	23	36·5	13·4	5·5	Tops dead, leaves brown and shed.		
	10	12 hrs.	,,	5·9	38·8	35	95·7	16·1	17·5	Tops dead, leaves brown, tubers fibrous		
	10	12 hrs and 5 hrs. electric	,,	56·8	19·1	59	99·2	20·2	31·0	Leaves green, petals, etc., lost as shed		
	10	Full daylight	,,	45·2	17·5	57	58·7	16·3	17·5	Leaves green, petals, etc., lost as shed		
										Per cent. fibre in stems.	Per cent N in stems.	
'Reading Star'	10	6 hrs.	4/10	5·0	58·0	20	42·5	13·5	8·7	54·0	1·47	Tops dead.
	10	12 hrs.	,,	9·9	25·1	38	120·5	16·4	22·2	58·1	1·30	
	10	12 hrs. and 5 hrs. electric	,,	122·2	21·1	63	93·1	13·1	42·5	57·5	0·98	Petals lost as shed.
	10	Full daylight	,,	35·9	20·6	54	34·5	16·5	13·0	60·5	1·01	Petals lost as shed.

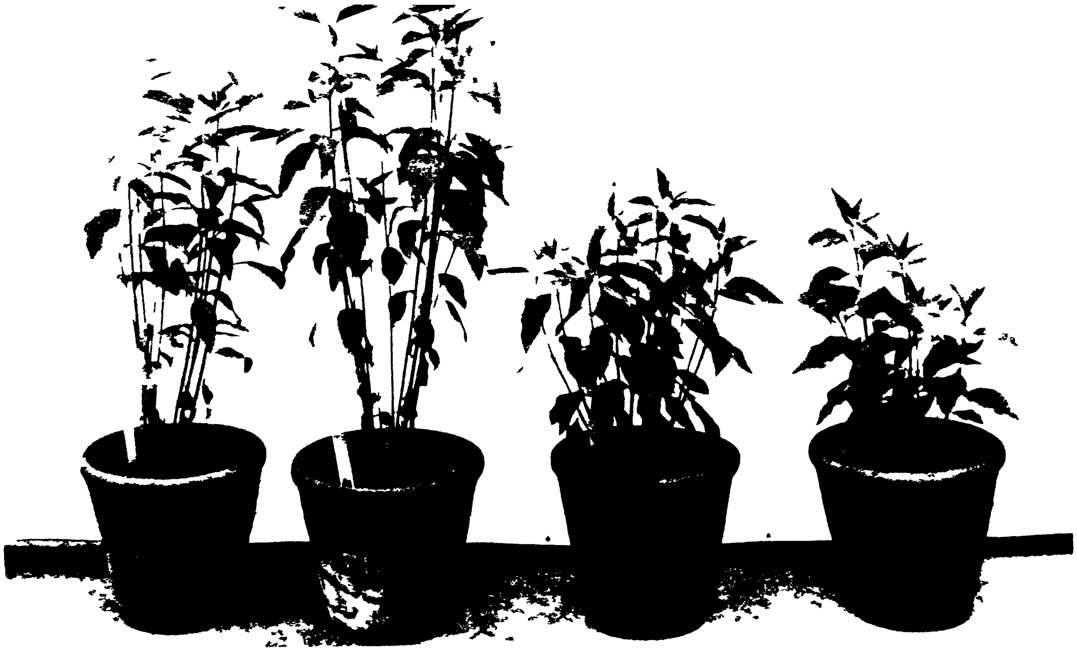
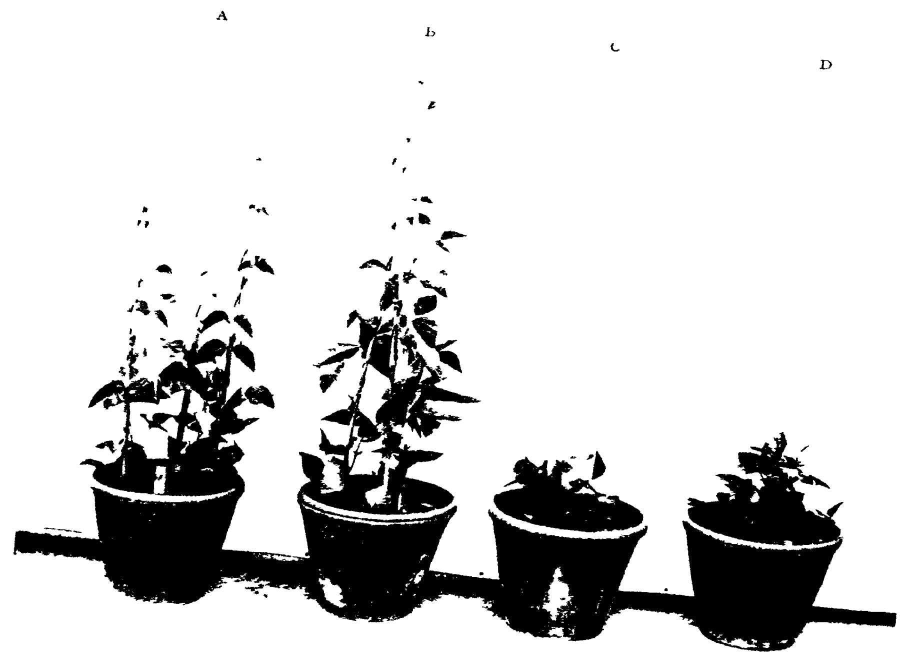


FIG. 152. HELIANTHUS TUBEROSUS

A Control plant B Received 12 hrs daylight 5 hrs electric light C Received 12 hrs daylight
D Received 6 hrs daylight

Tubers planted April 4 1928 Photographs taken August 17 1928

[*To face p* 364



[illegible] P[illegible]

[illegible] light [illegible] light (R [illegible] daylight
D R [illegible] daylight

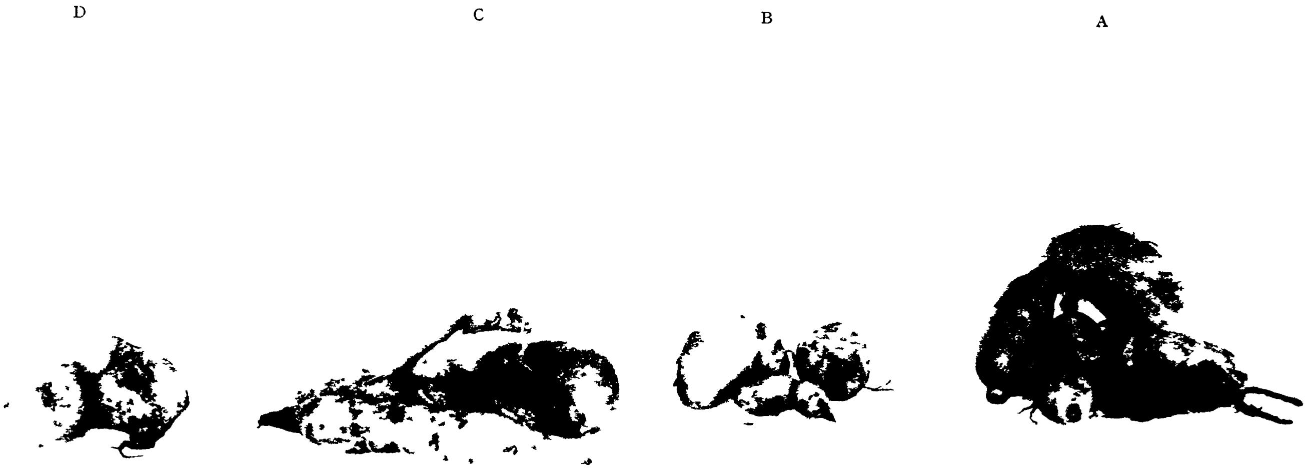


FIG. 154. DAHLIA TUBERS PRODUCED FROM TWO PLANTS IN A POT. Compare fig. 131.
A. From control plants. B. Received 12 hrs. daylight, 5 hrs. electric light. C. Received 12 hrs. daylight. D. Received 6 hrs. daylight.

[To face p. 365.

5 hours electric light in addition to the 12 hours daylight resembled the control series grown under normal conditions in that they grew vigorously and produced flowers and seed, and possessed normal roots. Previous experiments had demonstrated that the increase in dry weight of plants receiving short periods of light may be very rapid during the early periods of growth. This is illustrated by the graph on p. 363.

In the experiment referred to here the plants were allowed to remain until autumn when the fruits (controls) were ripe, and the graph (p. 366) shows the growth in height made by the different series, whilst Table III contains a summary of the data obtained by lifting and drying the plants in autumn.

TABLE III.

Showing the average weight in grams. of Phaseolus multiflorus plants grown under light periods of various lengths, five months—May to October.

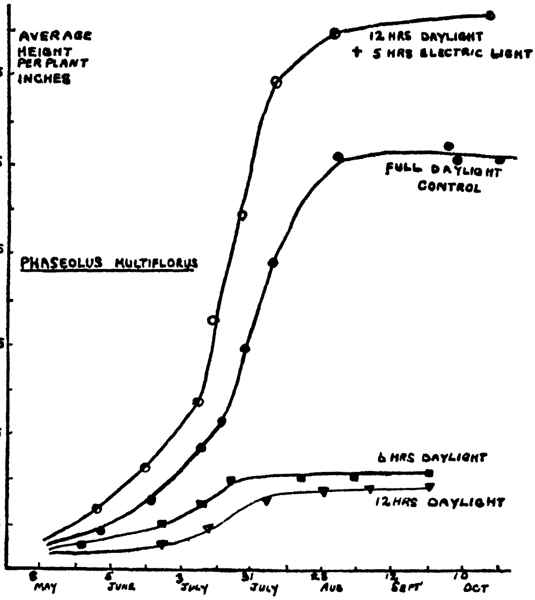
Hours of daylight.	No of plants involved	Weight of fresh tops	Per cent dry matter tops	Weight of fresh stem including petioles	Per cent dry matter stem
6	20	20·7	15·0	8·6	16·2
12	15	29·3	15·9	10·0	22·6
12 + 5 electric	15	38·5	19·4	52·2	24·1
Full	15	42·8	25·0	76·8	24·2

Hours of daylight	Weight of roots	Per cent dry matter roots	Fresh weight pods	Length stems uncurled cm	Average total dry weight recovered
6	21·7	20·1	0	45	10·3
12	48·7	25·3	0	40	18·95
12 + 5 electric	8·5	18·8	155·5*	204	48·8
Full	11·4	17·2	344·0†	200·8	95·9

* % dry matter 17·3 † % dry matter 18·3.

The data indicate that the control plants which received the full daylight produced more leaves than did the plants subjected to 12 and 6 hours daylight. The addition of 5 hours electric light to 12 hours daylight caused an increase in the weight of leaves produced. More striking, however, are the figures relating to the weight of stem produced. The additional 5 hours electric light caused approximately five times as much stem-growth; but the stems of the control series were the heaviest. No flowers were produced by the series receiving

6 hours and 12 hours, and although the plants subjected to the electric light produced many pods the heaviest crop of seed was produced by the controls. The average total dry weight of the plants of the series receiving 12 hours daylight and 5 hours electric light was greater than that of the series which received only 12 hours daylight, but less than that of the control series.



(3) General Discussion.

A. THE INFLUENCE OF LIGHT UPON THE HABIT OF GROWTH.

In the experiments just described, the habit of growth of plants subjected to 12 hours daylight differed from that of the control plants receiving the full natural daylight of the season, which varied from 14 to 19 hours. Plants receiving 12 hours daylight and 5 hours electric light resembled the control series. Therefore, light of low intensity can bring about a decided change in the habit of growth. Under the long periods of light (either natural or natural and artificial) many plants continue to grow upwards, producing new leaves and long internodes. Part of the carbohydrate food is then utilized in the formation of new tissues. On the other hand, short periods of daylight prevent elongation and favour the rapid formation of tubers in those species in which this is possible; in *Phaseolus multiflorus* the root acted early in the season as a storage organ. These experiments demonstrate the controlling influence of light upon growth, and the utilization of the food products in Dahlias and Artichokes.

The response shown by potato plants to different lengths of light varies with the variety tested, as McClelland [44] demonstrated.

The ratio of top growth to tuber formation can be greatly decreased by curtailing the daily period of illumination. It is possible that an optimum period for tuberization exists for each variety. (See [61].)

Many workers have recorded results dealing with the influence of light on growth. With *Phaseolus multiflorus* previously grown in the dark and then exposed to a light intensity of 2,880 metre candles for daily periods of 5, 2, 4, and 12 hours, TRUMPF [66] demonstrated that the phenomena usually associated with etiolation disappear. With light of higher intensity, 40,000 metre c.p., even shorter daily exposures of half-hour and 10 minutes caused marked changes in form. Moreover, in certain series the changes took place without the production of chlorophyll, so that it was not possible to explain the results on a basis of photosynthetic considerations only as COUPIN [11] suggested. These results have received ample confirmation by PRIESTLEY [53] and his co-workers. PRIESTLEY [53], discussing TRUMPF's results, states that the experiments indicate that

> " The effects cannot be exerted directly upon the machinery of growth because, if the plant is exposed to light for a brief period in which growth is suspended owing to low temperatures or the action of anaesthetics, when growth is resumed in darkness these morphological changes still result, being brought about by the previous light exposure."

These experiments perhaps also indicate that in

> " the changes of form produced by light on etiolation the quantity of light is the factor concerned."

Considering the influence of periods of light of longer duration, the work of GARNER and ALLARD [20], and others, shows clearly that light of low intensity can influence growth. Importance is here attached particularly to the *period* of illumination. One other interesting feature of the results was that two exposures of, for example, 4 hours each, but with an interval of darkness between, did not influence growth as did one equally long continuous daily period of light of 8 hours. The results obtained by GARNER and ALLARD [20] with *Cosmos* are particularly clear. Under long periods of light, the period of natural illumination being lengthened by electric light of feeble intensity, the plants continued to grow upwards without flowering, whilst under short periods of light they flowered when they were small. No signs of etiolation were evident in plants receiving 5 hours daylight. In these experiments long periods of light cause an increase in growth in height, whereas in the etiolation work light checks pathological elongation.

GARNER and ALLARD [23] have recently published a summary of further experiments in which the alternating periods of light and dark were of very brief duration, such as 1 hour, 1 minute, and 15 seconds. Their results are interesting but puzzling; for the Soy-bean, a species which usually responds to short days by the production of flowers, failed to flower when subjected to short alternating periods of light and dark; whereas with *Rudbeckia bicolor*, a long-day plant, reproductive activity was accelerated. The authors summarize their recent results thus:

> "It is apparent that with plants in which flowering is favoured by short days as well as with those in which the opposite is so, the general effect of relatively short alternating periods of light and darkness on reproductive activity is much the same as that produced by long days or continuous illumination."

There is no suggestion of a short-day effect. With short periods of illumination, followed by equal periods of darkness each of under 1 minute duration, weak chlorotic spindling types of growth were observed, but with intervals of 15 seconds the type of growth again improved. It therefore appears, from these experiments, that with progressive shortening of the alternations a point is reached at which approximately normal growth again takes place; the full account of GARNER and ALLARD's work will therefore prove of much interest.

Mention must also be made of the work of HARVEY [28] and ADAMS [5] and HENDRICKS and HARVEY [30], who, by growing plants in continuous electric light, proved that a period of darkness is not a necessity. The earlier work of BONNIER [8] shows clearly the influence of continuous electric light upon morphological structure. MAXIMOW [45] reports that barley and wheat, amongst other plants, have also completed a life cycle when illuminated by continuous electric light. POPP [50] has shown that with Soy-beans, for example, there is an optimum intensity of illumination for the elongation of the stem, and, moreover, that the thickness and toughness of the stem varies as the intensity of the light. More recently the same worker has described experiments in which the wave-length of the light has also been controlled. JOHANSSON'S [34] results with radish indicate that the intensity and duration of the light can control the form and nature of the growth. From such a brief outline of the more recent work it may safely be concluded that both the quantity and the quality of the light affect plant growth. With equal safety the mechanism of the action of light upon growth cannot, as yet, be stated.

Perhaps it is necessary to point out here that other factors modify the growth of plants particularly sensitive to the daily period of light. GILBERT [24] has demonstrated that, in the case of *Cosmos*, early flower production can be assisted by low temperatures and high humidity. The influence of high temperature and a relative high humidity upon the growth of *Phaseolus multiflorus* under short days was observed by the present writer. Seeds of this species when sown in November produced elongating plants when grown in an orchid house, whilst in a cool greenhouse little elongation took place.

B. THE INCREASE IN DRY WEIGHT OF PLANTS SUBJECTED TO VARYING PERIODS OF LIGHT. PHOTOSYNTHESIS CONSIDERATIONS.

The increase in dry weight of a plant represents the net balance between the synthetic processes and the respiratory activity of the tissues by which substances are oxidized liberating energy. A very large proportion of the dry weight of a plant consists of compounds containing carbon. Generally the carbohydrate compounds manufactured by the leaf are either oxidized or utilized in the growing tissues or stored in special storage organs. Light of such low intensity as the electric light used in these experiments is not believed to aid directly the process by which the plant obtains its carbon. One might therefore expect that under short periods of daylight the rate of increase in dry weight would be reduced. That this is not always the case has been demonstrated; it was shown that, in the case of *Helianthus tuberosus*, plants receiving 10 hours daylight produced as much dry weight as did plants receiving the full natural illumination. In the first two or three months of their growth, plants of *Phaseolus multiflorus* receiving 10 hours light a day produced more dry weight than did the control series. This excess over the control series was largely due to the weight of starch which accumulated, particularly in the roots where it was stored, although the tissues of the stem also contained a higher percentage than usual. They are therefore indications that although the period of photosynthesis is reduced, plants may contain a high percentage of carbon compounds and be surprisingly heavy.

The recent work of LUBIMENKO and SZEGLOVA [40] demands close attention. These workers selected a number of species originating in tropical, arctic, and temperate regions, and grew plants of these species under varying periods of daylight. The data they obtained by weighing the plants indicate that the period of illumination under which the maximum dry weight is produced varies with the species and the source of origin. For example, some plants of tropical origin show a maximum production of dry weight when subjected to a shorter period of light than is normal in these northern latitudes; a prolongation of this period, as well as a reduction, caused a diminution in the production of dry matter. Arctic plants, which do not flourish under periods of light of short duration, produce also much less dry matter under shorter days. Certain Arctic species like *Papaver nudicaule* die rapidly under short periods of light. (Various members of the Gramineae, when tested by the present writer [60], yielded similar results, less dry weight being produced under shorter days.) Species obtained from temperate regions occupied an intermediate position in their light requirements. These authors state that plants therefore exhibit an adaptation to the length of the period of daylight, and in subsequent publications—" L'Adaptation Photopériodique " [41]—attempt an analysis of this phenomenon. For a number of species they find the comparative rate of the production of dry matter an hour is greater in the case of plants receiving light for shorter periods of illumination. To quote the authors:

> "The maximum production (of dry weight) calculated for light periods of 1 hour is obtained with a series of plants, like *Benincasa cerifera*, *Momordica Charantia*, *Gossypium herbaceum*, *Phaseolus vulgaris*, under an appreciable shortening of the period of light to 10 hours or even to 8 hours; with these plants, lengthening the daily period decreases the (hourly) productivity and the utilization of the light for synthesis diminishes, but the general increase in dry weight continues with certain species like *Momordica Charantia* and *Gossypium herbaceum* owing to the prolongation of the period of light."

Results of a similar nature can be obtained by calculation in the case of the artichoke and young runner bean plants from the data published in this paper.

It appeared possible that the rate at which photosynthesis was carried out by certain species under conditions of short days was increased beyond the normal. That this is actually the case, for some species, was proved by LUBIMENKO and SZEGLOVA [41] by measuring the volume of carbon-dioxide gas taken in each hour by an equal area of leaf surface of a series of plants grown under different daily periods of illumination. They measured this intake of gas both when the reaction commenced—that is, when the plants were brought out of the dark into the light—and also after exposure to the light for the various daily periods of time. They also measured the rate at which carbon dioxide was given out as the result of respiratory changes, and concluded that the magnitude of the latter process depended upon the amount of available carbohydrate—a lack of such products, caused either by prolonged translocation in the dark or by diminished production due to growing the plants under varying thicknesses of shading material, tended to diminish the rate of the reaction. These measurements were obtained from detached leaves. In order to obtain confirmation of these results, the production of starch, indicated by the degree of coloration produced with iodine, was observed with attached leaves on the plants grown under various periods of light. Again, tests were made both on bringing the plants out of the dark and after exposure to the light for various periods. These results indicate that with certain species, Momordica for example, more starch is found in the leaves of plants receiving 6 hours daylight than in plants receiving the full daylight. With *Phaseolus vulgaris*, which contained no starch after being in the dark for 18 hours, it would appear that as much starch was found in the leaves of the 6-hour series after exposure to the light as in the full daylight series.

Independent experiments of a similar nature were carried out with *Phaseolus multiflorus*, on a small scale by the writer, in 1927. A comparison was made between the rate of starch formation in the control and 10-hour plants when equally illuminated side by side.

A preliminary series of tests revealed the fact that after 75 hours in the dark at room temperature the leaves (except the guard cells)* and petioles contained no starch. Starch-free plants were then exposed to the natural illumination and tests made after varying intervals of time. A few typical results are here presented. The plants had been subjected to the various periods of daylight since sowing, which took place on May 2, 1927, and were therefore approximately seven weeks old.

TABLE IV.

Showing the rate of starch formation in leaves of Phaseolus multiflorus grown under different daily periods of light.

Date.	Time.	Light.	Temp.	Series.	Result by iodine test.
	A.M. P.M.				
29/6/27	11.45–6 15	Bright, no sunshine	16·3°–17° C.	Control, leaves attached	Faint purple tint
,,	,,	,,	,,	10 hrs., attached	Black round veins, diffuse purple elsewhere
,,	,,	,,	,,	8 hrs., attached	All leaf black, much starch
,,	11.45–7.30	,,	,,	Control, petioles in water	No starch in some, traces in other leaves, slight purple colour
,,	,,	,,	,,	10 hrs., petioles in water	All leaves a diffuse purple colour
,,	,,	,,	,,	8 hrs., petioles in water	All leaves purple and black in patches
4/7/27	10 45–8 30	Dull morning, very bright sunshine 2 to 5·30	16·5°–18·8° C.	Control, attached	8 leaves, purple colour
,,	,,	,,	,,	10 hrs., attached	9 leaves, darker colour
,,	,,	,,	,,	8 hrs., attached	12 leaves, black, starch abundant

Although the leaves of the 10-hour and 8-hour series are thicker, the darker coloration was not believed to be so caused, as sections also indicated that more starch was present in the short day series.

It is seen that plants grown under daily periods of 10 and 8 hours daylight form starch more rapidly in their leaves than do plants grown under the full natural daylight. This result was obtained with both detached leaves in water and attached leaves. Confirmatory results were obtained from a further series, in which plants were much younger and had only been subjected to the short periods of daylight for a month. Plants which had been grown under short periods of illumination and then placed under normal conditions for 3 days still exhibited the phenomenon of rapid starch formation. After 14 days in normal conditions, elongation had commenced, and such plants had lost this characteristic of rapid starch formation.

---

* Incidentally excellent material for the demonstration of guard cells is provided in this way.

The accumulation of carbohydrate food products must be pictured as a series of reactions following one after the other. Certain stages in this series can be distinguished—the initial photo-reduction stage is followed by the condensation phase ; this in turn is followed by translocation of the food products to the growing regions or storage organs. LUBIMENKO'S [41] work draws our attention to the influence of the later stages on the production of dry matter. If we now examine our data concerning the increase in dry weight of *Phaseolus multiflorus*, it is found that whilst the short-day plants are producing the underground storage organs the rate of increase in dry weight is higher than in the control plants where the carbohydrate food is used for the production of new tissues. After flowering, however, when the young seeds are developing, there are in the control plants a number of centres of food condensation. Then the control plants each produce more dry weight than the short-day plants in which the accumulation of starch in the roots has now ceased.

Controlling the formation of these centres of food accumulation is one way, we consider, in which light of even feeble intensity can govern the production of dry weight. The production of excessively " leafy " plants, in which the area of the leaf surface is increased, is another response of the plant to varying periods of light which tends to control the production of dry weight. The changes in the anatomy of the leaf must not be forgotten in this connexion [see 48 and 62].

C. THE PRODUCTION OF FLOWERS BY LONG-DAY AND SHORT-DAY PLANTS.

In a previous publication the carbohydrate-nitrogen theory of flower production has been outlined and considered in its application to the effects obtained by altering the length of day. A review of the carbohydrate-nitrogen theory has been published by KNIGHT [36], GURGAR [26], and HOOKER [32]. Briefly, this theory states that for flower production to take place the ratio carbohydrate/nitrogenous compounds must lie within certain limits. The analyses of NIGHTINGALE [46] and GILBERT [25] also afford support to this hypothesis. The recent work of HICKS [31] traces out the c/n ratio in a developing wheat plant. DEATS [13] also suggests that the relative length of day and night may operate by influencing this ratio. This writer worked with Nasturtiums, Pepper, and Tomatos. AUCHTER and HARLEY [6] obtained similar data as the result of their work with Soy-beans. LUBIMENKO [41] concludes that the essential difference between species of the long-day and short-day series rests in the specific relationship between the rate of oxidation and respiratory changes on the one hand, and the rate of synthesis on the other. In the long-day plants oxidation is proportionally greater than in short-day plants when compared with photosynthesis, so that these plants tend to use up carbohydrates rapidly in short days. EATON'S [14] results with Soy-beans show the influence of rapid oxidation on flower production. In other words, short days often tend to alter the c/n ratio. Short days cause some species, e.g. *Phaseolus multiflorus*, to suffer from an excess of carbohydrates, whilst others like Hordeum, Phleum, Dactylis, appear on analysis to suffer from a lack of carbohydrates. The two theories are complementary. There is no doubt that short-day plants are particularly sensitive to the controlling influence of the period of illumination as it affects their rate of growth, and hence the utilization of the carbohydrates. LUBIMENKO [41] suggests that the relative activity of the enzymes of the oxidation and reduction system is a fundamental physiological difference between the two series, but no direct measurements of enzyme activity have been carried out in this connexion.

PRACTICAL APPLICATIONS.

In a review of the position of agricultural research, Sir JOHN RUSSELL [55] pointed out that the period of agricultural research since 1884 has been marked by the recognition that the plant is plastic. During this period economic problems concerned with plant growth have not been neglected. On one hand, hereditary factors have been subjected to very thorough investigation by geneticists, whilst on the other hand, by controlling the environmental conditions and so regulating growth, the plasticity of economic plants has been further demonstrated by agronomists and plant physiologists.

The work of TOURNAIS [65], KLEBS [37], GARNER and ALLARD [19], to mention but few, has demonstrated that plant growth and the production of flowers—normally a phenomenon of rhythmic nature—can be controlled by manipulation of environmental factors. One ultimate aim of the progressive horticulturist is to exercise complete control over his cultures. Hence the recognition of any factor influencing both the habit of growth and the production of blossoms, as does this complex " length of day " factor, must prove of interest to practical growers : because during the ten years that have elapsed since the earlier experiments of GARNER and ALLARD [17] many workers have been attracted to this interesting question, results of practical value have been obtained.

From the point of view of the plant-breeder difficulty is often experienced in bringing about pollination and subsequent fertilization between a normally early and a late variety. By manipulating the " length of day " EMERSON [15] has been able to cause the production of flowers in teosinte (*Reana luxurians*) to take place at a time suitable for carrying out cross-pollination with maize. More recently DAVIES [12] has employed essentially the same technique in crossing late and early strains of pedigree grasses. HARRINGTON [27] has described a technique by which he has been able to accelerate the production of flowers for genetical purposes by supplementing the winter daylight with electric light.

The different response shown by varieties to various periods of light has been employed by OAKLEY and WESTOVER [47] as a means of early identification in the case of lucerne. There can be no doubt that the same methods are applicable to many of our own herbage plants, as both the results of the writer [61] and EVANS [16] indicate. PIETERS [49], however, found that melilot did not show large enough differences in internodal growth between the annual and biennial form to enable him to utilize this response to length of day as a distinguishing test for the two types. BREMER [9] classified winter, spring, and summer Lettuces according to their reaction to the length of daily period of light. YOSHI [68] has studied the response to different periods of light shown by varieties of rice of commercial importance in Japan. The reaction of different strains or " pure lines " to the different lengths of day affords an indication of the potential behaviour of the plants in other latitudes. WANSER [67], working with wheat, considers " photoperiodism " a determining factor in acclimatization. From his experiments with Onions MCCLELLAND [44] concluded that only certain varieties were suitable for growing in tropical countries where the length of day is so short that many varieties do not form bulbs. It should not be forgotten that it was the difficulty experienced in obtaining flowers of the giant Maryland tobacco in other latitudes that led GARNER and ALLARD to their earlier experiments.

The technique adapted in these experiments has proved of value for other lines of research work. SHULL [56] employed such methods in determining the nature of a multiple-seeded *Xanthium*; ROBERTS [54] to enable him to study the relationship between fruitfulness of young trees and their internal composition.

It has been shown that flower production can be greatly accelerated in many species by reducing or prolonging the length of the light period. The application of such methods in horticultural practice can only be decided by economic considerations. That growth can be easily modified by electric light of low intensity demonstrates that for such purposes the installation of an expensive lighting system is not always a necessity. HOSTERMANN [33] in his experiments by supplementing the daylight with electric light of high intensity—a light intensity of some 600 metre c.p. was employed—for 6 hours was able to accelerate very considerably the rate of growth of lettuce, lilac, strawberries and other plants. TJEBBES and UPHOF [64] report that they have hastened the production of flowering in tulips, hyacinths, and crocuses by prolonging the period of illumination by electric light.

We see therefore that results of practical significance have already been obtained by utilizing the methods outlined, that is by prolonging the period of illumination, as well as by using light of high intensity—a much more expensive process.

SUMMARY.

(1) A further number of species have been subjected to curtailed daily periods of light. It was found that *Phacelia campanularia*, *Nigella damascena*, and *Nemophila insignis* reacted as long-day plants. These species prolonged their vegetative growth when subjected to short days.

(2) Flowering was delayed by short periods of light in the case of mangels, whilst sugar beet ripened its fruit more slowly under a period of 10 hours light per day. The varieties of swede tested did not show any striking difference between the 10 hour and control series.

(3) It was found that the habit of growth of a number of species when grown under a daily period of 12 hours daylight, prolonged by 5 hours electric light of weak intensity (2–5 c.p.), resembled that of plants receiving the full natural daylight (some 16 hours a day) far more closely than that of plants receiving 12 hours daylight a day. This was observed with both short-day and long-day plants.

(4) Other species tested indicated that light of weak intensity can modify the rate of tuber production, and the utilization of the food products.

(5) The increase in dry weight of plants receiving short periods of illumination may, in certain species, be greater than that of plants receiving longer periods of light. It is the writer's opinion that the rate at which food products are utilized either for growth or for storage purposes in tuber or seed, where a large quantity of carbohydrate is quickly packed away, is one factor tending to control the general synthesis and the production of dry weight.

I desire to express my thanks to Professor R. G. STAPLEDON, of the Welsh Plant Breeding Station, for his stimulating interest and continued help, and particularly for his kind permission to present some of the results obtained at that station in the Society's JOURNAL. It is with pleasure that I thank the Wisley Committee of the Royal Horticultural Society, for I am indebted to them for the provision of the necessary apparatus and facilities for carrying out these experiments, and to the Director of Wisley for his able help and counsel, so kindly given throughout. I desire also to record my thanks to Mr. N. K. GOULD for the photographs made for this report. The cultural details were carried out by members of the Garden Staff at Wisley and the Welsh Plant Breeding Station, to whom I am indebted for their careful attention.

LITERATURE CITED.

(Where necessary titles have been translated for convenience and are indicated thus *.)

[1] Adams, J., "The Effect on certain Plants of altering the Daily Period of Light," *Ann. Bot.*, vol. 37, p. 75, 1923.

[2] —— "Duration of Light and Growth," *ibid.*, vol. 38, p. 509, 1924.

[3] —— "The Effect on Tomato, Soy-beans, and other Plants of altering the Daily Period of Light," *Amer. Journ. Bot.*, vol. 11, no. 4, p. 229, 1924.

[4] —— "Does Light determine the Date of Heading Out in Winter Wheat and Winter Rye ?" *ibid.*, no. 8, p. 535, 1924.

[5] —— "Some Further Experiments on the Relation of Light to Growth," *ibid.*, vol. 41, no. 7, p. 398, 1925.

[6] Auchter, E., and Harley, C. P., "Effect of various Lengths of Day on Development of some Horticultural Plants," *Amer. Soc. Hort. Sci. Proc.*, Rep. 1924, p. 199

[7] Bonnier, G., and Hanhault, C., * "Observations on the Modification of the Vegetation correlated with the Physical Conditions of the Environment," *Ann. de Sci. Nat.*, 6th Series, vol. 8, 1878.

[8] Bonnier, G., * "The Influence of continuous Electric Light on the Form and Structure of Plants," *Rev. Gén. de Bot.*, vol. 7, p. 240, 1895.

[9] Bremer, A. H., "Cabbage Lettuce in Frames and Open Ground," *Meld. Norges Landbr.*, vol. ix., p. 1, 1929.

[10] Curtel, G., * "Physiological Researches on the Transpiration and Assimilation during Arctic Nights," *Rev. Gén. de Bot.*, vol. 2, p. 7, 1890.

[11] Coupin, H., * "On the Causes of Elongation of the Stem of Etiolated Plants," *Compt. vendus, Acad. Sci. Paris*, vol. 170, p. 189, 1920.

[12] Davies, J. G., "On a Method of Cross-pollinating Late and Early Cocksfoot" (unpublished), Welsh Plant Breeding Station Records, 1926.

[13] Deats, M. E., "The Effect on Plants of the Increase and Decrease of the Period of Illumination over that of the Normal Day Period," *Amer. Journ. Bot.*, vol. 12, no. 7, p. 384, 1925.

[14] Eaton, F. M., "Assimilation Respiration Balance as related to Length of Day Reactions of Soy-beans," *Bot. Gaz.*, vol. 77, no. 3, p. 311, 1924.

[15] Emerson, R. A., "Control of Flowering in Teosinte," *Journ. Heredity*, vol. 15, no. 1, p. 41, 1924.

[16] Evans, M. W., "The Life History of Timothy," *U.S.A. Dep. Agric. Bull.*, no. 1450, 1927.

[17] Garner, W. W., and Allard, H. A., "Effect of Length of Day and Other Factors of the Environment on Growth and Reproduction in Plants," *Journ. Agric. Res.*, vol. 18, no. 11, p. 553, 1920.

[18] —— "Effect of Light on Plants," *Ann. Rep. Smithsonian Institute*, p. 569, 1920.

[19] —— "Flowering and Fruiting of Plants Controlled by Length of Day," Separate 852, *Year Book U.S. Dep. Agr.*, 1920. Washington. 1921.

[20] —— "Further Studies in Photoperiodism: The Response of the Plant to Relative Length of Day and Night," *Journ. Agric. Res.*, vol. 23, no. 11, p. 871, 1923.

[21] —— and Bacon, C. W., "Photoperiodism in Relation to Hydrogen-ion Concentration of the Cell-Sap and the Carbohydrate Content of the Plant," *ibid.*, vol. 27, no. 3, p. 119, 1924.

[22] —— "Localization of the Response in Plants to Relative Length of Day and Night," *ibid.*, vol. 31, no. 6, p. 555, 1925.

[23] —— "Effect of Short Alternating Periods of Light and Darkness in Plant Growth," *Science*, vol. 66, no. 1697, p. 40, July 1927.

[24] Gilbert, B. E., "The Response of certain Photoperiodic Plants to Differing Temperatures and Humidity Conditions, *Ann. Bot.*, vol. 158, p. 315, 1926.

[25] —— "The Interrelation of Relative Day Length and Temperature," *Bot. Gaz.*, vol. 81, p. 1, 1926.

[26] Gurgar, J., "The Carbohydrate/Nitrogen Ratio in Relation to Plant Metabolism," *Science*, vol. 51, p. 351, 1920.

[27] Harrington, J. B., "Growing Wheat and Barley Hybrids in Winter by means of Artificial Light," *Sci. Agric.*, vol. 7, no. 4, p. 125, 1926.

[28] Harvey, R. B., "Growth of Plants in Artificial Light," *Bot. Gaz.*, vol. 74, p. 447, 1922.

[29] Harvey, R. B., "Growth of Plants in Artificial Light," *Minnesota Exp. Sta. Rep.*, p. 103, 1922.

[30] Hendricks, E., and Harvey, R. B., "The Growth of Plants in Artificial Light," *Bot. Gaz.*, vol. 77, p. 330, 1924.

[31] Hicks, P. A., "The Carbohydrate-Nitrogen Ratio in the Wheat Plant," *New Phytol.*, vol. 27, pp. 1 and 108, 1928.

[32] Hooker, H. D., "A Summary of Investigations by American Horticulturists on Carbohydrate/Nitrogen Relations," *Journ. Pom.*, vol. 5, p. 1, 1925.

[33] Hostermann, N. F., *"Experiments on Use of Artificial Light for Aiding Plant Growth," *Ver. Deutsch., Ingom.*, vol. 16, p. 523. Berlin, 1922.

[34] Johansson, N., "An Investigation on the Influence of different Illuminations on the vegetative development of Raphanus sativus," *Flora. oder Allgem. Bot. Zeit.*, N.F. Bd. 21, h/3 and 4, p. 222, 1927.

[35] Kellerman, K. F., "A Review of the Discovery of Photoperiodism: The Influence of Length of Daily Light Periods upon the Growth of Plants," *Quart. Rev. Biol.*, vol. 1, p. 87, 1926.

[36] Knight, R. C., "The Carbohydrate/Nitrogen Ratio," *Sci. Prog.*, vol. 19, p. 34, 1924.

[37] Klebs, G., *"On the Flower Production of Sempervivum," *Flora*, N.F. Bd. 21–22, p. 128, 1918.

[38] Knott, G. E., "Further Localization of the Response in Plant Tissues to Relative Length of Day and Night," *Amer. Soc. Hort. Sci. Proc.*, 23, p. 67, 1926.

[39] Lubimenko, V., *"The Biology of Photosynthesis," *Rev. Gén. de Bot.*, Tome 40, no. 476, p. 486, 1928.

[40] —— and Szeglova, O., *"Adaptations of Plants to the Length of the Daily Illumination Period, *Compt. rendus, Acad. Sci. Paris*, vol. 176, no. 26, p. 1915, 1923.

[41] —— "The Photoperiodic Adaptation of Plants," *Rev. Gén. de Bot*, Tome 40, no. 477, p. 513 (*continued* in no. 478 and nos. 479–480), 1928.

[42] McClelland, T. B., "Effect of Variation in Day Length on Growth of certain Plants," *Porto Rico Exp. Sta. Rep.*, p. 10, 1924.

[43] —— "The Photoperiodism of Tephrosia candida," *Journ. Agr. Res.*, vol. 28, p. 445, 1924.

[44] —— "Studies of the Photoperiodism of some Economic Plants," *Jour. Agr. Res.*, vol. 37, no. 10, p. 603, 1928.

[45] Maximow, N. A., "Cultivation of Plants in Electric Light," *Biol. Zentralb.*, vol. 45, no. 10, p. 627, 1925.

[46] Nightingale, G. T., "Light in Relation to Growth and Chemical Composition of some Horticultural Plants," *Proc. Amer. Soc. Hort. Sci., Nineteenth Ann. Rep.*, p. 18, 1922.

[47] Oakley, R. A., and Westover, H. L., "Effect of Length of Day on Seedlings of Alfalfa Varieties and the Possibility of utilizing this as a Practical Means of Identification," *Journ. Agr. Res.*, vol. 21, p. 599, 1921.

[48] Pfeiffer, N. E., "Microchemical and Morphological Studies of the Effect of Light on Plants," *Bot. Gaz.*, vol. 81, p. 173, 1926.

[49] Pieters, A. J., "Differences in Internode Length between, and Effect of Variations in Light Duration upon Seedlings of Annual and Biennial White Sweet Clover," *Journ. Agr. Res.*, vol. 31, p. 585, 1925.

[50] Popp, H. W., "The Effect of Light Intensity on the Growth of Soy-beans and its Relation to the Autocatalyst Theory of Growth," *Bot. Gaz.*, vol. 82, p. 306, 1926.

[51] —— "A Physiological Study of the Effect of Light on Various Ranges of Wave-length on the Growth of Plants," *Amer. Journ. Bot.*, vol. 13, p. 706, 1926.

[52] Priestley, J. H., and Redington, G., "A Study of the Effect of Decimal Periodicity upon Fibre Production," *Proc. Leeds Phil. Soc.*, vol. 1, p. 17, 1925.

[53] —— "Light and Growth. The Effect of Brief Light Exposure upon Etiolated Plants," *New Phytologist*, vol. 24, no. 5, p. 272, 1925; vol. 25, no. 3, p. 145, 1926; vol. 25, no. 4, p. 213, 1926

[54] Roberts, R H., "Relation of Composition to the Growth and Fruitfulness of Young Apples as affected by Seedling Shading and Photoperiod," *Plant Physiol.*, vol. 2, no. 3, p. 273, 1927.

[55] Russell, Sir John, "Presidential Address, Section M," *Rep. Brit. Ass. Adv. Sci.* (Toronto), 1924; *Nature*, vol. 114, p. 350, 1924.

[56] Shull, C. A., "Nature of the Multiple Seeded Xanthium," *Bot. Gaz.*, vol. 83, p. 385, 1927.

[57] Schaffner, J. H., "Effect of Length of Daylight on Sex Reversal in Hemp," *Ecology*, vol. 4, p. 323, 1923.

[58] —— "The Change of Opposite to Alternate Phyllotaxy and Repeated Rejuvenation in Hemp by means of Changed Photoperiod," *Ecology*, vol. 7, p. 315, 1926.

[59] —— "Control of Sex Reversal in the Tassel of Indian Corn," *Bot. Gaz.*, vol. 84, no. 4, p. 440, 1928.

[60] Tincker, M. A. H., "Effect of Length of Day on Flowering and Growth," *Nature*, vol. 114, p. 350, 1924.

[61] —— "The Effect of Length of Day upon the Growth and Reproduction of some Economic Plants," *Ann. Bot.*, vol. 39, p. 721, 1925.

[62] —— "The Effect of Length of Day upon the Growth and Internal Composition of some Economic Plants," *Rep. Brit. Ass. Adv. Sci.* (Oxford), p. 412, 1926.

[63] —— "The Effect of Length of Day upon the Growth and Chemical Composition of the Tissues of Certain Economic Plants," *Ann. Bot.*, vol. 42, p. 101, 1928.

[64] Tjebbes, K., and Uphof, J. C. T. L., *"The Influence of Electric Light on Plant Growth," *Landw. Jahrb.*, Bd. 61, p. 315, 1921.

[65] Tournais, J., *"The Influence of Light on the Flowering of Japanese Hops and Hemp," *Comptes rendus, Acad. Sci. Paris*, vol. 153, 1911; vol. 155, 1912.

[66] Trumpf, C., *"On the Influence of Intermittent Light on Etiolated Plants," *Bot. Archiv.*, vol. 5, p. 381, 1924.

[67] Wanser, H. M., "Photoperiodism of Wheat, a Determining Factor in Acclimatization," *Science*, vol. 56, p. 313, 1922.

[68] Yoshi, Y., *"On the Influence of the Relative Length of Day and Night on Plants," *Sci. Rep. Tohoka Imp. Univ.*, 4th Series, vol. 2, No. 2.

HERBACEOUS BORDERS.

By Mrs. W. J. MULLER.

[Read August 14, 1928; Mr. W. A. BILNEY, J.P, V.M.H., in the Chair.]

I FEEL the subject of Herbaceous Borders must be a perennial one, because people apparently have always something to say and write about it, and of course it is a very important part of our gardens, and therefore is particularly interesting. It has been my good fortune to be able to travel over most parts of the earth, both in Europe and further East, where people look upon gardening as part of civilization and culture as well as for the entertainment of one another, but I always come back and find in my own country great joy. In England we have the most beautiful gardens, the most skilful cultivators, and the most beautiful flowers you can see anywhere, in spite of a very awkward climate. I do not think you can see anywhere in the world a show such as we have at Chelsea, and I have seen many hundreds, nor can you see in any other city anything to equal the fortnightly shows held under this roof. I believe it is largely because of these things that our people have taken to gardening in the extraordinary way they have, and it is to the people who have small houses, cottages, and those awful places called bungalows that are breaking out all over the face of our fair land, that we shall have to look in future for the beautifying of the country which has become very " uglified " since the War. The more of gardens we can get, the more we shall be inspired to do in the direction of beautifying our whole land.

Now, we are always taught that the line of beauty is a curve, yet although this is a generally accepted fact, we are very apt to go altogether wrong in these lines with bordering. Of course we cannot help having very straight lines in our kitchen gardens, and it may be necessary to have straight walks up to our front door, but we need not always have straight lines for our borders time after time. You can go into nine out of ten gardens and you will see nothing but lines; there will be a straight border, a straight lawn, and then a hedge or wall forming another straight line; this inevitably leads to straight planting, and what would otherwise be a charming garden becomes a series of lines. Of course it saves a lot of trouble; once you have got a straight line, you have got it, but it does not lead anywhere, there are no illusions, and gardens should have illusions: we want to imagine something beyond. However beautiful the plants are, if they form just an ordinary line, a good deal of the charm is lost; the formation of curves wonderfully improves borders, so I ask you to-day to consider the matter of the curve when planting. I have ten or eleven borders to look after, and the forms I am fondest of are in wide and graceful curves. I cannot tell you how much more interesting they are, and how much better they suit the qualities of the different plants. I do not know why that should be so, but it is a fact, and it is a great enjoyment to me to think out different curves to fit the different beds. It is not at all easy. You start away with pegs and a line, and you find it is extraordinarily difficult to get a very graceful curve. They will come too short or too long or too wide. To get a really beautiful curved border in a garden is very difficult, but like other things in life, the more difficult it is, the more interested you become; you are not going to be beaten by it, and you will go on until you get something that really satisfies the eye. Your ideas are always changing about the curve, you look at the curve from the bottom and think the top is much narrower, and then you look at it from the top and think the bottom is much narrower. There is always something amusing about it, but in the end you work out a scheme that is a rest to the eye and that will make an important change in your garden. When you have got away from lines and have embarked on a series of curves, they will interest you profoundly. There are so many things a curve will do, and it really takes you days to think one out; if you begin on paper in the drawing-room it is quite easy, but on the lawn the thing has an entirely different effect.

Having got your curve, you begin to plant it, and again people have strange ideas. You see so many gardens that are spoilt by rows and rows of beautiful plants in solid ranks like soldiers, the high one at the back, the medium ones in the middle, and then the smaller ones, and when once you have looked at it, you don't want to look any more, because it is merely repetition. A gentleman who came to see my garden said "You have a charming garden," and then "I fear I never seem to get very far with my garden. I arrange it all and then I do not want to look at it any more." Remembering his garden I was not surprised: it was all the same, tall things at the top, then the medium ones and then the small things. I replied, "You go and dig it all up and don't always put the tall things behind and arrange them in rows, let them wave about as they do in Nature, and you will get that broken effect which is so charming." These gardens will either help us enormously in England or be just a repetition of hundreds of others up and down the country. Everywhere you go there are hundreds of villas, houses, and bungalows that are amazingly and extraordinarily ugly in themselves, and they sadly want redeeming by the beauty and design of their gardens. Little sections cut out into other little sections are not at all beautiful, because you have a straight line and inside that another one, and it all adds to the bare effect. Because you have one straight line, you need not put another inside. I do not think the Japanese would look at the straight line at all; we never see it in Nature, she knows far too much. If people would consider this matter of line before they laid out their gardens they could create much more charming effects.

Having got our shape we have to go into the matter of colour. Here, again, people with herbaceous borders make very strange effects:

they put in great clumps of white daisies, and violent scarlet where they have no right to have them at all, and all sorts of glaring colours which have nothing to do with the harmonious effects of Nature. In spring Nature dresses herself in white and mauve and yellow, in summer she puts on blues and pinks, orange, crimson and red and other exquisite colours, then in the autumn she comes back to her first colours, white and mauve and yellow. If we keep these primary ideas in our minds, it is quite easy to add the complementary colours ourselves. In the spring, if we want blue and pink, we have the Tulips, and in the autumn the pink Chrysanthemums.

A great many people bundle the colours together and in the end their borders become beautiful for a month or two, but they lack all interest as the months go past, simply because they have forgotten the fundamental colour scheme of Nature herself. I think this fact will account for the very dull borders we often see in which large bunches come at stated intervals, very ugly indeed, sometimes helped by a violent patch of scarlet Salvia. It makes one think the scarlet Salvia ought to be burnt when, for no reason at all, it is put quite close to delicate things in mauve and yellow; you can see nothing but the patch of scarlet. Immediately you can only see one colour in your border to the exclusion of the others, your border is all wrong. I would not put the Salvia anywhere in my garden at all, but many people are fond of it and say " Isn't it a wonderful blaze of colour ? " Of course it is, but nobody takes any interest in it after the first look. It is just the same with the glorious scarlet Poppies. Do not put them in your borders, they have no right there at all. Poppies ought to be by themselves with plenty of green where their loose floppy heads can do what they like, and where that glorious flaming colour cannot upset everything else. To see a delicate pink put next to a flaming scarlet is to destroy them both. One looks vulgar and the other looks washed out. The beautiful pink Poppy, 'Lady Stobart,' should find a place in your border, its colour is so exquisite and delicate that it never really hurts anything. A great friend of mine has a very lovely herbaceous border, and he asked me to go and see him, and when I went he said " What is the matter with my border ? " I replied " It is very lovely if you take those Poppies out." He said " What an extraordinary idea; but now you mention it, that is what has been worrying me all the time. Yes, you are quite right, they are wrong where they are; and when they are dead they look disgusting, and they shall come out." The following year the Poppies were in a corner by themselves where they were quite lovely with a background of green, and the border was flourishing with pink Poppies in the place of the scarlet ones, with a little white 'Mrs. Perry'; the border had gained enormously.

It never really struck me before how blatant and insistent red is in a border. Whatever you do, be very careful of white, but be much more careful of red. All the pinks and the yellows or the oranges or the blues or the greens are lovely and they all help each other, but immediately you add scarlet to your border, or a great mass of white, you have done entirely the wrong thing. You will know it at once, because you won't see anything else. Have a small clump of white, but beware of a heavy mass of white, and do not on any account put any scarlet near it. Such a combination is hard and ugly; it is, of course, because the colours are so hard that the whole thing looks wrong. Such blunders may be made by the best-intentioned people in the world; one reason is because these Poppies and Daisies are very easy to grow. One must try to get rid of that lazy feeling. One sees this in many borders, even in very lovely places where the gardens are a joy and where money is poured out without ceasing. In these gardens there is often a certain amount of monotony. You will see a beautiful arrangement of colour going on for 20 yards, and then another, and it is repeated again and again the whole way down. You say "Yes, very charming," but you do not want to go on looking at that same system of grouping; it is quite easy, but not at all artistic. Most charming effects can be gained by a little bit of grey, or some grasses, and especially with the beautiful Japanese Maple. Just for a moment consider the lovely effect of some of the shrubs with grey foliage, like the Lavender. I have grown every sort and colour of Eschscholzia, the deep orange and deep red, and behind that again the sword-like Gladioli and Montbretias with the tall, straight foliage of such a wonderful green. I have a towering group of Hollyhocks, they are beautiful things, but they have a nasty, ugly habit of becoming rusted and form sometimes horrible objects; but if put behind some leafy plant, the effect is quite different. All herbaceous borders should have some Hollyhocks for their old-world effect. Try to grow those that branch out, they are an enormous improvement on the tall Hollyhock, unless you have a tall wall at the back.

Having got these things that form the permanent colour scheme, you can get on to purple. You can have purple Salvia, which is a glorious thing. Put in some of those delightful Sidalceas, they are beautiful in the most delightful strains of colour from the palest pink down to the richest carmine, and they never disappoint you.

Then plant some grasses. I cannot imagine why people forget to put grasses in their borders. I have been lately to see twenty or thirty different borders, and have not seen a single one with grass in it. The other day I went to see a garden which has been designed by a great artist for a friend of mine and he has been very insistent on putting groups of grass to divide up the schemes of colour, and they gave great distinction to the whole border.

We do not want to be like our neighbours, we each try to make our borders a little different from the one next door, and if we think out these little schemes of colour for ourselves, we shall find it quite easy to give this touch of novelty. I use a great many Brooms, because in the spring they give you the colour you want, they also give you height. They are very useful and altogether charming; we see them whenever we go to Chelsea, but we do not, I think, buy them enough; if we do buy them, we often put them in the wrong place. In the border they are charming. Their green is quite inoffensive, they add distinction, and they help enormously in the spring. You can get cream and orange, pink and white, almost every colour, and they grow easily. With Broom, standard Maples, and different coloured grasses, you can get an effect that should be a great deal more seen than it is; there is blue grass, grey grass, and green grass, each one more beautiful than the last. A friend of mine gave me a nice clump of blue grass which is rather a rarity. I put it in and it is extraordinarily effective and enormously helpful, because it holds up all sorts of things that flop about, but it is walking all over the place. It has strolled into the path and into the lawn, always beautiful, though sometimes out of place, but you can always cut it out and give it to a friend, and tell him it is rare. If afterwards he says " Have you found it runs a little, this grass? " you say " Yes, but you can give a bit away." It is a great help and very lovely for cut flowers, for it lasts well in water.

I do not think people use foliage as much as they should. I always put in myself that strong-smelling herb, Fennel; a group is in a border with Helianthus coming through. That particular bit of Fennel happens to be the making of that group of flowers in the garden, because they wanted a little help. In the same way you put in that delightful feathery white stuff we are so fond of, Gypsophila, but it wants something to help it. It is a most delightful way of gardening to find out what will grow through and help to colour plants like this. By itself it is a little faded. The use of foliage of course helps staking. Staking a border is one of the most difficult things to do.

I went to see a large garden lately where the border was a sorry sight. Everything was tied twice to an enormous stake, at the top and the bottom, and it was the saddest thing possible. This wonderful garden was marred by these enormous stakes tied up with cord, and nothing looked well—it was rather an object-lesson on how not to do it. I thought we had got past tying things up with one string and one stake, but there are people who are a little bit on the lazy side, and you really cannot do it, you must have three stakes. I know it is a bore and takes a great deal of time. Always put your stakes in near the root and let them branch out, and when your border has grown out, you will never see the sticks. That is the whole art: you ought never to see the stakes, or the way your border is kept in order. I have seen people do it with all sorts and kinds of twigs and sticks, and it has not in the end been satisfactory. You must take the trouble to use three or four sticks to everything, particularly to big, heavy clumps. It well repays you, because it is the look that nothing is tied that makes your border charming. I have been in so many gardens lately where the effect has been spoilt by the things flopping all over the place, or being tied in tight bundles.

Many of the more delicate shrubs should be put in the border; they have been much neglected. You very seldom see shrubs in the herbaceous border, and flowering shrubs have the greatest interest, and great charm. You cannot get an established look unless you have some of these extraordinarily pretty shrubs. I cannot go into the names, but we all know how many shrubs there are that are entirely in place in the border, because they are too delicate for the shrubbery proper. Using these, putting bulbs round them, and letting them come through their leaves, you have a very charming and unusual effect.

In new gardens the herbaceous border runs straight to the end of the garden where it ends against a hedge or a wall. That is all wrong. You want to go from your border to something else that is interesting, you do not want it to be cut off in a square line at the end. You should gradually go from your border into a sort of shrubbery, with some Brooms, double Cherries, anything you like, gradually running into it and letting the border end naturally in a large and handsome group of something. It always has a more satisfying effect. By keeping away from ugly things, and by careful planting, you can accomplish an interesting grouping that makes you want to see what is round the corner. If the border is properly planted, that is what it makes you want to do. If people walk round and say "Very charming! What lovely flowers!" and then go into the house, you know you have failed. If they want to linger and sit down, you feel quite different. That is one of the peculiar, psychological things about a garden. Therefore try to get your border to end in something that makes you want to see beyond.

Then of course the bulb question is always extremely interesting. Personally I never put Daffodils in my borders; it is perfectly right if you want to have them there, but I think they need grass meadows, they want to go under trees; they are not nice in the border, because they are such a long time getting rid of the green. Tulips are wonderful—we cannot do without them; but the Darwin Tulips, not to be a nuisance, should be a little far back, put in 9 inches to a foot deep. A lot of people almost cry when they hear me say that, but once they have done it, they will never do anything else, because the bulb that goes 9 inches to a foot will not be eaten by slugs or get that horrible scald, and when the plant comes up, you have the full beauty. The plant is strong and large, and then when it is over, you can cut it off and put your little annual seeds in between. They come up in due time, fall over the green of the Tulip, and you have no trouble at all, they do on their own without help. The little annuals are sheltered and held up, you have not the trouble of digging up your bulbs, and you have no bare spaces. If your bulbs have pleased you, the colour can be repeated in whatever annual you put in: if it is pink, put in a pink annual; if it is orange, put in orange. If you have a colour scheme, you can always carry it on by putting in annuals of the same colour as your Tulips. I have suggested this once or twice to people who had not thought of it, and they have been very satisfied with the result. It is very easy to scatter the seeds of annuals in that way when you have got your groups of colour ; it will do away with all the ugly spaces which you have to leave if the bulbs are lett standing. It is really rather a lazy way of gardening, but I think it is a better way because year after year the bulbs come, and you have a charming border again. Nowadays very many of us do the gardening ourselves, or perhaps with the help of one man, and if the man does the lawn and grows the vegetables, he cannot do a great deal in the other part of the garden.

I think we have spoken of most of the things that concern herbaceous borders, except planting in shade. A great many people go on planting exactly the same sort of sun-loving things under trees, and complain bitterly that they look pale and drawn. I have seen it over and over again, and they altogether lose sight of the fact that they are throwing away a golden opportunity. Many flowers love the shade, or partial shade ; there are the Pansies, most of the Lilies, and the Funkias, the Foxgloves, the Phloxes, and the Bamboo much prefers it. The Bamboos are perfectly lovely if you treat them right, but you must remember the Bamboo hates and detests wind ; it is not very fond of the blazing sun and really likes a more or less sheltered place. I have seen them in great perfection in their own country, and they grow under the very tallest trees down by the stream in soggy soil. They flourish amazingly in these spots, but you do not see them in arid, hot places or in windy corners. The black-stemmed Bamboo will grow, and it is very lovely, but you must give it shelter ; it will not grow in a hedge. They are not at all suited for hedges, their natural way of growing is in clumps. Do not put the beautiful, sun-loving things under the drip of the trees ; it is done so often. If a thing loves a blazing sun, it does not love shade. By doing this, you miss the chance of planting something which adds charm and interest to your border. If we realized there were so many things that do well in the shade, we should give up putting these sun-loving things in the wrong place.

I also use the Rose tribes for my border, *Rosa Moyesii* and things you grow for their foliage. I put them near the end, because they grow very naturally towards the shrubbery and are very pretty in themselves ; the green is delightful and the flower adds distinction in a way that nothing else does. I use Funkias because of their colourings : the beautiful grey is delicious against the pinks, the green comes against the orange, and the peculiar blue will go with anything. We do not see these colours nearly enough in our borders, we go on planting the same old things, and I think we should try to break away from this method.

Some people like Irises and others do not bother about them, but they improve borders enormously, their tall, sword-like foliage helps so much.

The pink Poppies, especially 'Mrs. Stobart,' are delightful, but are rather difficult to manage. The easiest way to stake them is to put a bit of wire round them. I just put it with two stakes on either side. I use this also for the Gladioli. They lean up against the wire and do not then need staking; then the leaves of other plants cover up the wire, and you have a charming effect. If you stake Gladioli, they immediately look uncomfortable and their beauty is gone. A friend of mine asked me round to see his Gladioli which he told me were beautiful. He took me into the garden, and I saw the Gladioli each one tied to an enormous stake, one here and another one there, and so on. A sad sight!

Another thing we might realize in our border planting is the beauty of Phloxes. Of all the plants in the world, I think Phlox is the one thing that wants massing; they are extraordinarily beautiful, but they want help from one another. You may have pink and white and red and mauve, almost every known colour; with the exception of two, none of them quarrel.

In certain plants, such as Hollyhocks and Sidalceas, do not put all the same colour together; if you plant a group of Delphiniums, never put all one blue: put dark, light and medium, the white eye, the black eye, and the single, then you get a glorious effect. You do not want to see the same plant and the same colour in your border in any of these things, and three or four shades of the same plant can nearly always be obtained; you thus also gain the beautiful effect of sunlight playing on the different colours. A great many people forget the effect of sunlight on flowers, and how the different shades of plants take on different colours about sunset: many flowers are very beautiful in a fading light, and if we will only study this aspect many entrancing borders will result. In a golden light certain borders look perfectly exquisite, and it is because you have chosen flowers that take on a certain form and a certain shade from the sun in a certain condition. It is a little difficult to follow, but if you will watch your garden and watch the effect of the sun at different times of the day on your plants, you will understand what I mean, and if you plant with this idea in view, you will have a new interest in your border.

PLANT HUNTING IN CRETE, 1925-26-27.

By G. P. Baker.

I first saw Crete from the deck of a steamer, when for hours the vessel skirted its southern coast, showing up a backbone of mountains extending the full length of the island. A few miles from its western end these mountains rise sheer from the sea and attain an altitude of 8,000 feet. Here and there in its system one could make out a gap or cutting, and as we coasted along we could see that the main axis of this mountain backbone receded from the coast, revealing an inland plain—Messara—which I afterwards got to know, and forming, here and there along the coast, bays and headlands. It was early in the year and snow capped all their upper slopes. Occasionally a group of white buildings told of a monastery, whilst villages were seen few and far between. The boldness of its barren hills impressed and set me wondering whether it would be my lot some day to make myself acquainted with its inner recesses, its flora, and people.

I read the stories of travellers, and got a cursory insight into the botany of the island. Historically I found it not without interest. Beginning with the three Fathers of Botany, Theophrastus, Dioscorides, and Pliny, I find the two former named some ten species as belonging to Crete, whilst Pliny added twenty-two more, of which twelve were designated as varieties *Cretensis*. The plants of Crete acquired fame principally in the works of Pliny, who amongst the learned men of his time knew the greater number of economic species in the island.

Throughout antiquity, and the dark Middle Ages which followed, the island was a seat of opulence and culture. Its fortunate position in respect of Europe attracted the attention of travellers, naturalists and merchants, some of whom discovered the virtue of plants and made a few additions to the general catalogue. It was not, however, till the eve of the Renaissance from the fourteenth to the sixteenth centuries, when the island was enjoying the peaceful domination of the Venetians, and travelling thereto was relatively easy, that medical science began its rational progress, and botany was studied in all its branches. The systematic collection of plants by true botanists became more pronounced, so that by the end of the seventeenth century an additional 490 species were added to the list. The final stage in the progress brings us to the eighteenth and nineteenth centuries, when the scientific botanist appeared on the scene, correcting the nomenclature of former lists, classifying and adding. These learned men gave to the science a direction which has been followed by subsequent botanists. The list as now catalogued exceeds 1,400 species and varieties.

Amongst the more prominent botanists who visited the island

and contributed to the foregoing may be mentioned ONORIO BELLI (1594), sometime resident in Canea. He corresponded with CLUSIUS. Then followed TOURNEFORT (1700), OLIVIER, SIBTHORP, SIEBER, FRIVALDSKY, RAULIN, HELDREICH, BALDACCI, and lastly HALACSY, whose "Conspectus Florae Graecae" embodies references to all the more prominent contributors.

Plant hunting has a wonderful fascination and romance, and when one can add to it camp life and an opportunity of learning something of the people of the country, it is all the more delightful. I found it so.

My first visit to Crete was in the early summer of 1925, a pioneer visit to see its possibilities for future holidays. Landing at Canea, I found the hotel of TREVOR BATTYE's days had changed hands; under new management it had every indication of Oriental discomfort and unsanitary condition. I decided to re-embark and proceeded to Candia, from whence my first journey to Mount Ida was made.

My second trip to Canea was with Mr. HIATT BAKER in the autumn of 1926. On this occasion Mr. SHIRLEY ATCHLEY, that indefatigable walker and ardent plant collector of the British Legation at Athens, gave us a letter to his Greek companion, a retired Major of the Police. Major BONAKIS made us welcome, placed an empty room in his house at our disposal, and later acted as our guide in the various expeditions we made. At his home our servant prepared our breakfast. All other meals we took at one of the restaurants of the town. This is the custom, for no hotels provide meals.

Crete is the first of the Aegean islands one approaches from the west. It is approximately 165 miles long, 12 miles across in the narrowest part, and 35 miles in its widest section. In area it is about the size of Corsica. Long before we reached the island the Aspro Vouna (White Mountains) were plainly visible. Hills beyond hills rise from the plateau zone and form a massive whole with pretty villages and many-coloured fields, and supply a beautiful background to the capital town of Canea with its small harbour, Venetian fortifications, and lighthouse.

The mountains of Crete are unlike any others I have ever seen. They are the very opposite to those of Corsica (one of the most beautiful islands of the Mediterranean Sea), where the castellated ridges of red granite set in a "maquis" of green in some parts meet the ultramarine blue of the Mediterranean Sea. Nevertheless, Crete is essentially a country of mountains with endless variety of rough jagged ground and precipitous gorges to interest the traveller before he reaches the bare masses of limestone rock which form the upper slopes of its mountains.

The flora of Crete is said to be poor and of little variety owing to the excessive drought in certain months of the year. The herbal vegetation, on the other hand, and particularly shrubby plants growing to a height of about 3 feet, which form the "maquis" of the hills, possess some of the same characteristics as one finds in other islands of the Mediterranean. They are scented and very spiny; the majority

FIG. 155. EUPHORBIA ACANTHOTHAMNOS IN CRETE

Photograph by Dr G. Maly

[To face p. 388

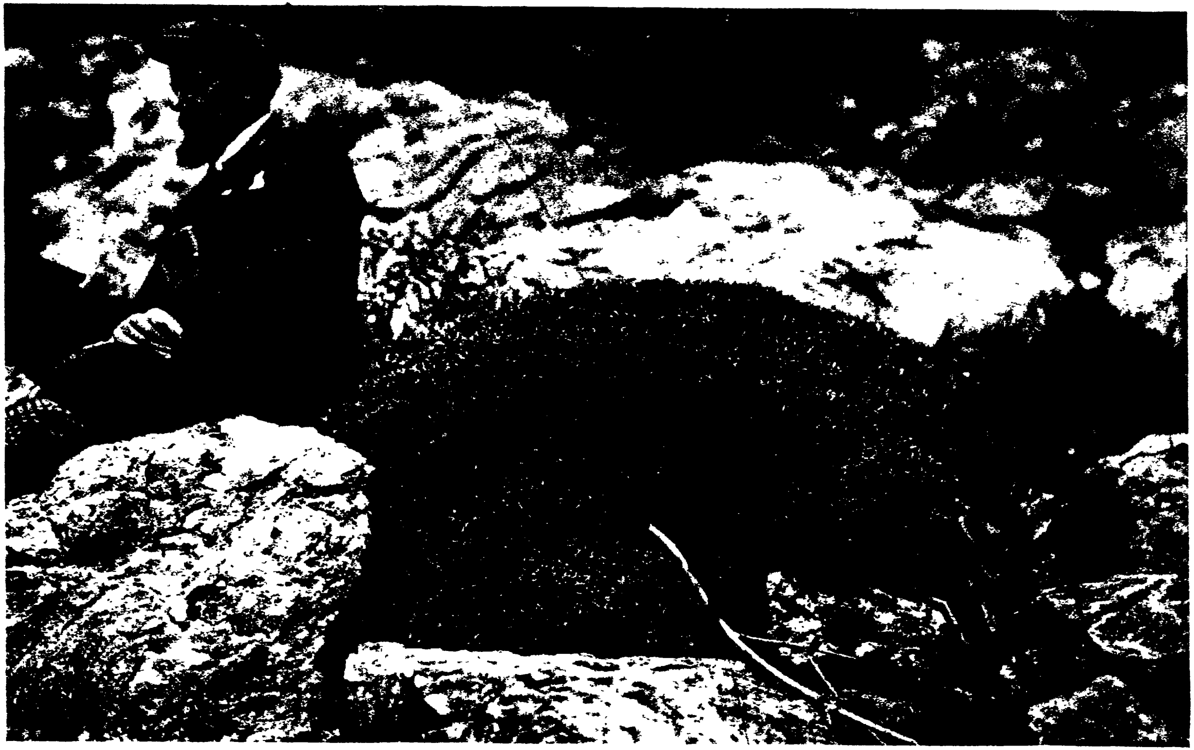


Fig. 136.—Poterium spinosum in Crete.

Photograph by Dr Robert Mariani.

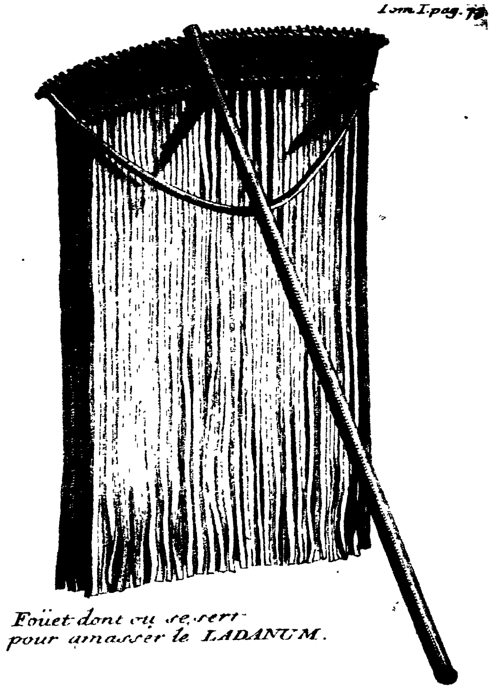


FIG. 137.—BRUSH FOR COLLECTING GUM LADANUM.

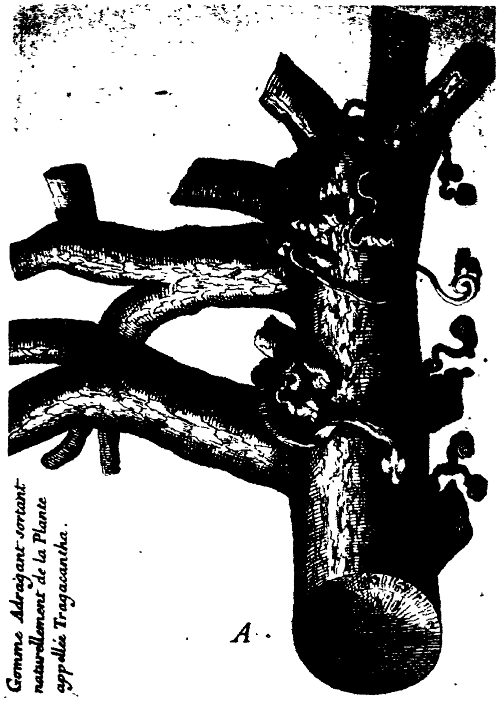


FIG. 138.—GUM TRAGACANTH.

From TOURNEFORT, "Voyage au Levant."

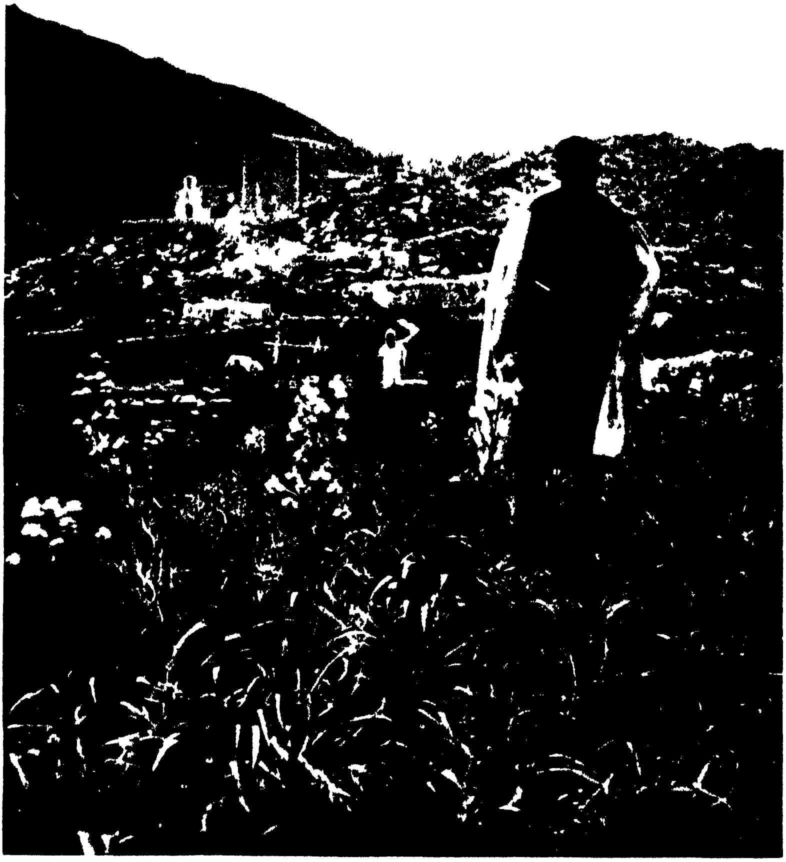


Photo Boissonnas, Geneva

FIG. 139.—ASPHODELINE CRETICA ON THE HOMALO PLAIN, CRETE

[*To face p.* 589

belong to the Labiates. Their spiny nature explains why men and women from all times wear boots reaching to the knee.

The common idea that plants have developed thorns as a protection against the depredations of animals is not accepted by scientists. Dr. M. RIKLI points out that the mule has no hesitation in grazing on spiny shrubs. His explanation rather is that the thorns develop on the plant for want of water, and he reminds us that the Holly when cultivated in a damp atmosphere bears much foliage and becomes almost wholly a non-spinous plant.

In the plains, valleys, and plateau zone, up to 2,500 feet altitude, the Olive is abundant; not so, however, in the plain of Messara, where the Carob replaces the Olive. The Vine reaches the same altitude, but is more localized. RAULIN estimated that two-thirds of the flora of Crete belongs to this zone.

The villages one sees are invariably dotted in terraces on the hillsides or buried in valleys.

As one ascends into the higher and second zone, and up to 3,500 feet, the forest begins, and the former vegetation gives place to the Oak, Maple, Cypress, and a few Pines. Here it is we get the spiny shrubs, such as Berberis, *Euphorbia acanthothamnos* (fig. 135), *Ononis diacantha*, and *Poterium spinosum* (fig. 136), together with Cistus in variety, Phlomis, Arbutus, *Pistacia Lentiscus*, *Quercus coccifera*, Tamarix, and *Crataegus monogyna*.

In the next and third zone, from 3,500 to 5,000 feet, many of the preceding varieties will be seen, to which may be added Phillyrea, *Acer creticum*, Daphne, *Quercus Ilex*, *Pyrus parviflora*, *Juniperus phoenicea*, Zelkova, and *Sorbus graeca*.

In the last and fourth zone, from 4,500 to 7,500 feet, in sheltered places, *Atraphaxis Billardieri*, *Prunus prostrata*, Rhamnus, *Juniperus Oxycedrus*, and *Astragalus creticus* * are plentiful on Mount Ida.

RAULIN estimated that in these last two upper zones the total number of plants represented but one-tenth of the flora of the island. As a rule we observed that when any variety is found in two or more zones, the height of the plant diminishes as the altitude increases.

In the beds of the valley where the heat is greatest on the north side of the White Mountains, orange, citron and lemon grow in great profusion and seemingly without much attention or care. We noticed many of the leaves of orange trees covered with a cochineal-like bug, but it did not appear to in any way diminish the yield or deteriorate the fruit, for some we tasted were just as luscious as those we gathered from the trees which showed no trace of disease.

---

* TOURNEFORT says ("Travels," i. p. 59): "This shrub spontaneously yields the Gum Adragant towards the end of June, and in the following months; at which time the nutritious juice of this plant, thickened by the heat, bursts open most of the vessels wherein it is contained. It is not only gathered in the heart of the trunk and branches, but also in the interspaces of the fibres, which are spread in a round figure or circle, like rays of the sun, as appears in the trunk marked A (fig. 138). This juice is coagulated into small threads which passing through the bark issue out little by little, according as they are protruded by the fresh supplies of juice arising from the roots: this substance being exposed to the air grows hard, and is formed either into lumps or slender pieces curled and winding in the nature of worms, more or less long according as matters offer. It seems as if the contraction of the fibres of this plant contributes to expressing the gum."

I am inclined to think that the gum Adragant or Tragacantha of Crete is no longer collected, otherwise I would have been told. The gum now in commerce is collected from the variety Verus and other species found on the hills in Asia Minor and Persia. It is an article used in pharmacy and also in the textile industries, producing a more tenacious mucilage than gum arabic.

Woodland and forest scenery, such as there is, is confined entirely to the mountainous districts, the Oak almost exclusively forms the woodland, e.g. copses of the Oak stripling *Quercus pubescens*, and in the larger forests the Evergreen Oak, *Quercus Ilex*. In the lower altitudes we found *Quercus coccifera*, the Kermes Oak, and *Quercus calliprinos*. As a rule these last are fine specimens, growing at some distance one from the other, indicating that they were self-planted.

On our way to Rhytimo, skirting the north coast, we passed through plantations of *Quercus macrolepis*, the Oak which gives Valonea—the sprouting leaves with their catkin-like blossoms in the spring of the year add to the interest of this species. *Styrax officinale* 10 feet high and a pink *Lythrum* 5 feet high were then in bloom; *Vitex Agnus-castus*, Oleander and Myrtle would be the autumn-flowering shrubs.

One of the characteristics of the island is its upland plains. There are three such basins, each in its separate group of hills at an elevation of 3,000 to 4,000 feet. They are enclosed within rounded hills rising from 1,000 to 3,000 feet around them. These plains are quite level and are drained of their waters by extraordinary potholes and passages in the limestone rock and so carry off their waters into the bowels of the mountain and then by fissures or faults find an exit to the lowland underground streams, even reaching the sea without any intermediate reappearance. By this interesting phenomenon the fishermen in some parts of the coast are supplied with fresh spring water in the very sea itself. Natural drainage, forming surface streams and rivers, is not in such evidence as one usually finds associated with ordinary hills.

My first visit to the Homalo plain in the White Mountains was in the autumn of 1926, accompanied by HIATT BAKER. We motored from Canea along the shore road going west of the town, a road much used and sadly out of repair; but as we left the main road conditions improved. Continuing in the bed of the valley we passed through Orange plantations and then struck the well-engineered zigzag track on the hillsides; conditions improved until at the village of Lakkos the first stage of our journey came to an end, the motor being replaced by mules. From thence the approach to the upland plain takes one west across a traverse of hills having on our left the rocky buttresses of the main group of mountains, and on our right an interesting panorama of the provinces of Kissamos and Cydonia with the rich valley of Platanos at our feet. The Bay of Canea and the promontories on each side, with the rich blue of the sea, made a pleasing addition to the view. At a spot where we noticed indications of water we came across *Laurentia tenella* growing in a steep bank.

After an hour we turned left into the hills by a rocky zigzag path, and passed through a veritable labyrinth of hills clothed with a scrub vegetation which in the autumn is deficient of colour. The drought and heat of summer had scorched everything and turned the familiar greens of spring into dirty and lifeless greeny yellows, which from afar conveyed to the eye a complete barrenness of vegetation; on closer examination, however, though the eye was deceived, the nose readily detected an aroma of natural oils throughout the whole "maquis" of this zone from 1,000 to 3,000 feet altitude; this aromatic feature is very noticeable. *Cistus creticus*, for instance, as compared to other varieties of this genus, when bruised, was found to exude an aromatic oil; the dejected and lifeless leaf of the Phlomis had its perfume; the Staechas, as we all know, has a lavender scent peculiar to itself; *Coridothymus capitatus* has a fragrant scent of the Thyme; whilst *Salvia cretica* and *Sideritis syriaca* and *Thymalea* each have their own particular fragrance. All these HIATT BAKER and I handled on our way. *Cyclamen pseudo-graecum* was then in full bloom, many peeping out of interstices and holes in the hard calcareous rock in which they had seeded themselves. To extract them was impossible: the corms had shaped themselves to the irregularities and to the uttermost limits of the cavities in which these delightful plants were growing.

The following spring, when on this same route with my brother Arthur, the country presented quite another picture. Then the upper hills were snow-clad and partly verdant with scattered trees of the Ilex, Oak, and a few Pines. Plants I had seen the previous autumn dull and barren were now in full bloom, to which was added the delicate fragrance of *Daphne sericea*: nor were we to be denied the beauties of spring *Cyclamen creticum*. We seem to have struck this route at the psychological moment, for all were in bloom. Spring in the East is of very short duration, not that this may apply to an altitude of 3,000 feet, but nearer the coast I have observed that buds break into blossom with great rapidity and die quickly; many which we culled in the early days of April had formed seed-pods when we returned to the same spot after an absence of but two weeks.

The Homalo plain is 3 to 4 miles across each way, and is visited by shepherds and families from the coast who make use of it during the summer months as a health resort. Around the edge of the plain they live in low cabin-like habitations built of stone without mortar.

With HIATT BAKER we pitched our tent at the foot of a rocky mound on which stands a civil guard barrack and a small church (fig. 139). Nights were getting cold and frosty at altitude 3,600 feet, and an exodus of summer visitors, shepherds and flocks had already taken place, leaving only one inhabitant to welcome us, and he a Protestant Greek Evangelist from America with an Irish wife. We visited their quarters and were entertained at tea with a beverage made from an infusion of the dried leaves of *Origanum Dictamnus* (Majorana) and *Sideritis syriaca*.

We crossed the plain towards one of its outlets at the south-east end. The attraction of this excursion was to see the wild gorge of Samaria, with its primeval forest of horizontal Cypress trees which lie buried in its depths in the narrowest part of the gorge, 3 hours below the inlet from the plain above. The track across the plain passes in parts through cultivated land, the work of villagers of the adjoining country, who grow Potatos and some cereals. Wild Pear trees, *Pyrus parviflora, Berberis cretica,* and an endemic Maple (*Acer creticum*) we noticed on our way, and a small tree allied to the Elm, a Zelkova, which is indigenous to the island, is not to be found in Western Europe. It is an Asiatic plant and is one of those interesting links which helps the botanist to connect the flora of Crete with that of Asia.*

As we strode along we little realized we were walking over bulbs of Crocus, Tulip, and Colchicum which were revealed to us in the following spring in all their beauty when they were there literally by the thousand —varieties rich and rare.

On the western slopes of the hill above the gap on the pass there are the ruins of a Turkish guard-house, one of the many to be seen on the island. They are always placed in positions visible to one another by bonfire. The one towards Samaria was in the bend in the depths of the gorge perched on a pinnacle. The highest points (8,000 feet) of the whole White Mountain range abut this gorge, and the gap at the entry is approximately 4,000 feet. It is known to the Cretans as the Xylo-Scala or wooden staircase, because of its formidable path zigzagging across a wall of rocks with a broken face. As one looks over from a point high up, the path below is scarcely visible. We wandered downwards absorbed with the varied flora, scattered and distorted specimens of Cypress trees, *Juniperus phoenicea,* showed signs of havoc caused by the violent gales they have at times to resist.

In the lower glades of this grove, completely sheltered by the lofty mountains around, many noble specimens of the horizontal Cypress we came to see were growing amidst great boulders and rock débris (fig. 140). The rugged intertwining roots formed a striking contrast to the upper and very graceful outline of the trees. There is a small church in their midst dedicated to St. Nicholas; embedded in the wall above the porch or at each end of the outer walls of the church were to be seen plaques of Italian or Venetian influence. The grove is ecclesiastical property and as such we were told the trees were sacred, but when I saw within a mile a new sawmill, I feared it will not be long before those magnificent trees cease to exist. We measured the girth of some of the trees: they averaged 18 to 20 feet.

Of the varied plants we saw on this excursion, we collected seeds of *Paeonia cretica, Ebenus creticus, Putoria calabrica, Ephedra fragilis, Acer creticum, Berberis cretica, Phlomis lanata, Verbascum spinosum, Cichorium spinosum, Dianthus arboreus, Sideritis syriaca, Cytisus creticus, Amygdalus incana,* and *Sedum creticum.*

---

* This last spring as soon as the snow made it possible for Major BONAKIS to go into the hills, he was commissioned to proceed to the spot where we saw the plants growing and to collect. Arrangements had already been made with the Imperial Airways, Ltd, the carriers of the Indian mails, whose planes call at Suda Bay, to take delivery of the plants. In that way the Zelkova has been introduced into this country.

I have said that certain of the flora of the island indicates Asiatic origin, a fact which geologists confirm. They point out that in the Tertiary Age the islands of the Aegean Archipelago formed part of a land connected with Asia: that a collapse of the crust of the land took place and becoming disintegrated the land was flooded and in that way the islands were formed. We had a good illustration of this process of disintegration when we were in the White Mountains under Haigha Plevma where the limestone slopes of varying consistency form open fissures shaped like glacier crevasses, varying from 6 to 70 feet wide and from 40 to 50 feet deep. These are sometimes longitudinal in their formation on the mountain slopes, whilst at other times they are horizontal across the slopes. The crevasses are all due to disintegration. In consequence of the heavy rainfalls, when it does rain, erosion is powerful; frost, snow, and wind have all aided this formation, but water disintegrating the softer particles has been the most powerful agent. But more interesting still in the same White Mountains, we passed over a wide and deep belt of dark shale and schist extending across a bed of limestone. This bed of shale, which may have been a quarter of a mile wide, was in places very broken and so deep that it gave us the impression of the collapse at some time of its surface—just as though the crust of a pie had fallen in. Fossil remains of a small hippopotamus have frequently been found in Crete as well as those of the bison, indicative of an African connexion.

Crete is rich in endemic plants inhabiting its higher regions; but more interesting are the palaeoendemics, relics of a flora which flourished when the island formed part of Asia and perhaps Africa.

I will take a few examples of the more interesting ones: *Ebenus creticus* which we collected in the Gorge of Rumeli belongs to a leguminous family, and figures in *Bot. Mag.*, vol. 27, plate 1095, under many synonyms. Of the twelve species of the genus known, ten belong to Asia, one reaches European soil, and the twelfth is the species which dwells in Crete. *Ricotia cretica* (syn. *Cardamine cretica*), altitude 3,500 feet, is indigenous to Crete, and dwells in damp corners near water. The other four species of this genus all belong to Asia. *Saxifraga hederacea* inhabits the region of springs and potholes in the mountains: its chief area of distribution is Asia Minor. In Greece it frequently appears, its extreme westerly outpost being Sicily. *Stachys cretica* has its central mass in the Near East, with its western limit the island of Zante. *Chionodoxa cretica* is again of Asia Minor; no bulbs of this genus are to be found on the Continent of Europe. *Zelkova cretica* (fig. 141) is related to the Elm family; all other species of the genus belong to either China, Japan, Arabia, or the Caucasus. The Cretan variety is an odd shrubby deciduous tree of 10 to 15 feet, confined to the White Mountains and Cyprus. Its branches are many and contorted; leaves elliptic and crenate, ⅝ inch long, about the size of *Azara microphylla*; shiny on one side and dull on the under side; flowers white and diffusing an agreeable odour. The Cretans make use of the branches by converting them into walking-sticks, as seen in the photographic group (fig. 142).* *Atraphaxis Billardieri* belongs to a genus of shrubs to be found in Siberia, the Caspian region, Persia, Armenia, and Sinai peninsula. This is the only species which has crossed into Europe; it is found in the mountain regions of Greece, and in one place only in Crete, immediately below the Nida plain on Mount Ida. *Staehelina arborescens* and *S. fruticosa* are decorative rock shrubs confined to the Eastern Mediterranean Islands, whereas the other two species of this family have their habitat on the burning hills of Greece and Syria. *S. arborescens* which we saw has leaves white on the under side. The flowers are like a diminutive Centaurea of pale rose; it is a very attractive shrub, and for a hot dry ledge high up or in a south wall would make a welcome addition to one's garden. *Verbascum spinosum* is confined to the White Mountains. This species of Mullein is quite hardy and well adapted for the rock garden and forms a spiny compact cushion 18 to 20 inches across. Its yellow corollas are a counterpart of its more exalted brethren of Asiatic origin, though smaller in size.

Celsia Arcturus (allied to Verbascum) is a native of Crete, originally introduced into Western Europe by an Italian resident in Candia. It is an attractive plant with pubescent leaves and rich yellow flowers. It figures in *Bot. Mag.*, vol. 45, tab. 1962. It is said to be tolerably hardy.

Of Irises there are few species: *I. sisyrinchium*, the very fleeting but delightful plant in many shades of blue, inhabits the Akrotiri and the rocks above the north side of Suda Bay. In the same country is *I. tuberosa*; *I. germanica* (syn. *pallida*) is not as common as I have been led to believe. Dr. RIKLI was fortunate in finding a colony under Mount Kedros on the south side of the island (fig. 143). *I. Cypriana*: in the garden of a Metropolitan, on the border of the Messara plain, I came across a whole mass of this variety growing in partial shade. The plants were in bloom and scented, and measured 5 feet 5 inches in height, strong in the stem, no supports being requisitioned, with good dark green leaves. Questioned as to their origin, the priest could not say how they had been acquired.

I. cretica is an *unguicularis* with short creeping rhizomes ⅓ of an inch in diameter; from these grow circular tufts with crowded leaves, glaucous, linear, erect, firm in texture, varying from 1/12 to ⅛ of an inch in breadth and reaching to a length of from 6 to 12 inches.

My introduction to *Iris cretica* came about in a somewhat odd manner. I was on a mule, and as I rode along, always intent on searching for plants, I suddenly found myself entangled in the branches of a tree which unseated me. I fell into a tussocky clump of what appeared to be grass, and then discovered to my intense delight the flowers of a small Iris, which turned out to be no other than the Cretan variety of *unguicularis.* Later on I came across many more plants in full bloom, mostly growing in sheltered places, and from what I recollect of the blossoms they are different from the variety I know as of Spanish and Algerian origin. All I saw had smaller flowers with splashes of dark violety blue and strong gold on a base of lavender and grey colours, and I think I am right in saying the falls and standards vary in their colour arrangements much more than do the Spanish varieties.

---

* There is a note by SMITH (*Trans. Linn. Soc.*, vol. ix. p. 126), who calls Zelkova *Abelicea* or Bastard Sandalwood. It was described by CLUSIUS in *Plantarum Historia* from information supplied by ONORIO BELLI dated Crete, 1594. It is there said to be "a large tree with abundance of branches. Its leaves are like those of the *Alaternus*, but rounder and deeply serrated. The fruit the size of pepper. The wood is hard with a slight degree of fragrance, in so much that its sawdust resembles the scent of sandalwood: the wood is used for making beams."

GIOVANNI PONA in the Italian edition of his *Monte Baldo*, Venice, 1617, p. 113, gives a woodcut of the branches and leaves, referred to by CLUSIUS as coming from ONORIO BELLI (fig. 141).

One may readily be deceived by taking the reed-like texture of this Iris for a coarse grass. HIATT BAKER thought so till he found a seed-pod almost in the soil at the base of a stem. This variety figures in *Bot. Mag.*, tab. 6343.

Of bulbous and tuber-rooted plants the island offers quite a large and varied collection. To reap the benefit of their beauty one's stay must be prolonged. When we were there in April we were too early for the Crocus in the hills, and when later we came down nearer to sea level, little remained of their blooms. Canea and its immediate surroundings can show Anemones, Ranunculi, Crocuses, and Cyclamen in variety. *Anemone coronaria* is fairly common. The colours are red, violet, rose, and white. *A. coronaria* with its varieties *parviflora* and *incisa*, and *A. stellata* (variety *Heldreichii*) are plentiful in upland regions. *Ranunculus :* of this genus there are some eighteen species. *R. asiaticus*, an Eastern Mediterranean plant, reaches its most westerly limit in Crete. It is found near the sea and in olive groves. The most fascinating is a white variety with a pale rose margin, almost a facsimile in colour and texture of a Shirley Poppy. On the coast road east of Canea a tall white variety with a large black eye luxuriates on the banks of ditches. Another, a tall yellow with a nigger-brown eye, we collected amongst the rocks in the valley of the nine villages (Ennea Koria) in the province of Kissamos. *R. cupreus*, a copper-coloured species, inhabits the highest mountains in eastern Crete and is again a good copy of a Poppy in all but colour. *R. bullatus* has a wide distribution along the North African coast ; it turns up in Crete and lives in damp shady spots among the olives. Its flowers are a buttercup yellow, sweet scented like a violet. *R. brevifolius* and *R. Sprunerianus* are denizens of the highest slopes. *Narcissus Tazetta* and *N. serotinus* are plentiful on the coast. *Cyclamen :* the spring-flowering, white species *creticum*, allied to *repandum*, we found on the hills above Suda Bay ; they were there by the thousand. *C. latifolium*, the rose-coloured spring species, we collected amongst the rock cliffs above the village of Suda. *C. pseudo-graecum* and *C. neapolitanum* are quite common, as we found in the uplands when there in the autumn. Of *Colchicum*, strange to narrate, Crete has but two species ; a small white we collected within 500 feet of the summit of Mount Ida, which must be allied to *pusillum*; the other has not bloomed yet with me. It may turn out to be *libanotium*. *Sternbergia lutea* or *graeca* was in bloom above our camp on Mount Ida. The collected bulbs have not yet deigned to show bloom.

Tulips.—Crete possesses but three species of Tulips, *praecox*, *saxatilis*, and *cretica*; the last two are of great merit. *Saxatilis* (fig. 144) inhabits open waste land and the rock ledges in the gorges; *cretica* belongs to the higher regions near the snow and comes into bloom as the snow melts. It is undoubtedly the most precious of my finds, and it was quite a bit of luck when I found a colony in bloom on my first journey in May 1925. It would appear that *Tulipa cretica*, even in its own habitat, is a scarce bulb. ATCHLEY, who has been over the ground on several occasions, has failed to find it, and begged me to send him two or three bulbs. TREVOR BATTYE in 1913 records finding two plants in the White Mountains. In 1926, with HIATT BAKER, we passed over the ground where the previous year they were in bloom. We had on that occasion three alpine axes in the party and turned over many slabs and much soil, and although we collected a good number of Crocuses, our find of Tulips was very meagre. There are two variations of the same form. The most pleasing has a rich maroon red on the outer sides of the outer segments, lined on their inner sides with a white film; the inner segments are white on both sides, with a slight indication of the same maroon faintly covering the white; anthers are orange, leaves keeled and curled outwards; the larger of the two varieties measured 1¼ inch in width, and the plant above the ground is 9 inches.

A Tulip was mentioned in 1680 by an Italian, Dr. BENNETTI. In his diary, written at that date, he says: "In the garden of the house at which a dinner was given to me at Eyoub on the Golden Horn (Constantinople), were magnificent tulips growing three and four on a stem—they are imported from Crete." This was at a time when the Sultans and amateurs rivalled each other in growing Tulips, and paid such extravagant prices that the Government were forced to prohibit the import as well as the exhibitions, which were held in the Square of Yeni Djami in Stamboul. Surely this Tulip was *T. saxatilis*.*

Of the spring-flowering species of Crocus *C. Olivieri* inhabits the lower hills, and *C. Sieberi* (var. *heterochromos*) the region of the snow, and was found by me on Mount Ida keeping company with *Tulipa cretica*

---

* W. R. DYKES, in an article on some wild species of Tulip, says (*R.H.S. Jour.*, **50**, p 250): "I set out to grow the Tulip species in the hope of discovering the origin of our garden Tulips, but I must confess that so far I am entirely baffled by the problem." He then goes on to say that it is possible when the Turks grew Tulips in large quantities in Constantinople, several centuries ago, they used as the parents "the Tulips of some valley in Asia Minor, from which the wild bulbs were entirely exhausted. The early Van Thol varieties may come from plants found in the Steppes of Russia, but as far as I can discover, there are no wild species at present in cultivation of which it could be said without any doubt that they are the parents of our garden plants."

I sometimes wonder whether the large-flowering variety of *T. sanatilis* referred to by Dr. BENNETTI would have been at all helpful to DYKES in his search. BENNETTI's diary is in a book entitled "Viaggi a Constantinopoli di Gio. Battistu," Venice, 1684.

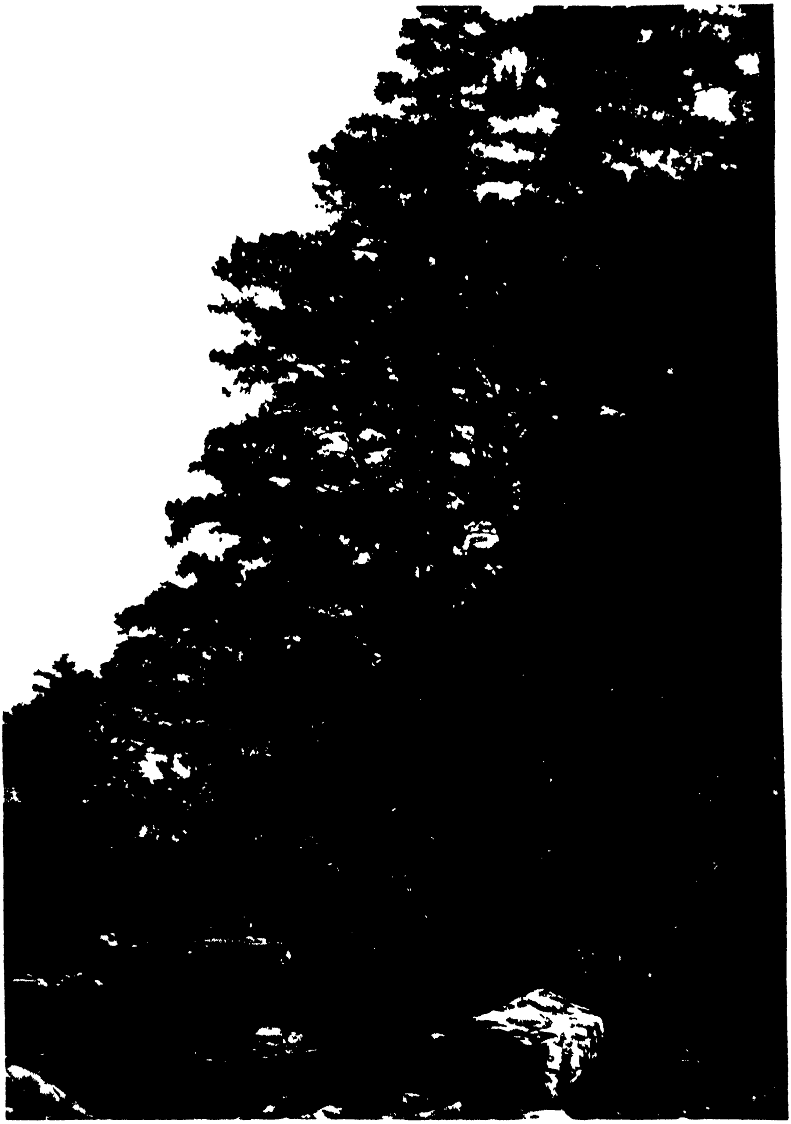


Photo G. I. [illegible]

FIG. 140. CYPRESS GROVE IN GORGE OF SAMARIA, CRETE.
CUPRESSUS SEMPERVIRENS HORIZONTALIS

[*To face p.* 396

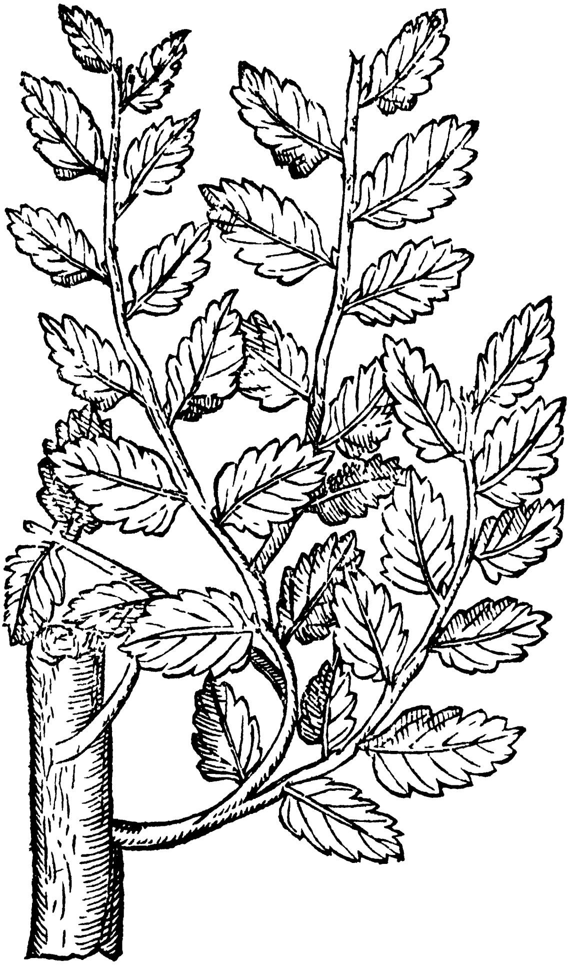


FIG. 141. ZELKOVA CRETICA.

From Tournefort, Relation d'un voyage au Levant, 1718.

[*To face p.* 597.

and *Chionodoxa.* Here again there are slight variations of colour in the segments. The strongest and most attractive has on the tips of the outer segments strong markings of pure dark purple, diminishing half-way down each segment and then merging into rich orange yellow, both colours being on a white base; the upper portions of the inner segments are white and then merge into orange down the throat; at the base of the throat of the outer segments there is a strong marking of dark maroon; the pistil extends beyond the anthers, which are of old gold, and divides into three widely opened trumpets of an intensely vivid orange. The second variety has all the same characteristics of colour and growth, the only difference being that in the outer segments the dark purple starts from the perianth tube and extends in a narrow stripe to the tip of the segment. In the case of the third variety the base of the throat has the same dark purple, and all the segments are white with strong orange merging from the base of the throat and extending half up the segments. The first variety I have described is not only stronger, but larger in the blooms and carries a number of flowering stems from one base. The seed capsules develop in the ground and emerge above ground as the seeds ripen. When I dug up the plants, I saw no seed-pods, and it was only after my arrival home that I discovered the seeds in their capsules, wrapped up in sheathing leaves and spathes. Of the autumn-flowering species, *C. veneris* occurs in Crete as it does also in Cyprus. It is said to be a diminutive variety of *C. Boryi*, being half its size. *C. laevigatus*, found by me on Akrotiri, bloomed with me this season. *C. Fontenayi* and *C. Cartwrightianus*, also belonging to the vicinity of Canea, have not shown their colours, and I cannot say if I have them. The bulbs as collected were not kept apart, and I fear got mixed and later were not graded before planting. *Chionodoxa:* Crete has its own special species, *C. cretica* and *C. nana*. The former is much allied to *Luciliae*, but the segments are tinged with the tone of puce, the colour of *Colchicum Bornmulleri*; it inhabits the upper woodland slopes and is often found protected under the branches of Berberis. *Nana* belongs to the region of snow: it is almost white, tinged on its outer rim of the segments with a suspicion of the same puce, and has a dark stem. *Asphodeline lutea* and *A. cretica:* the former is very abundant all over the island wherever rocks are exposed on uncultivated ground. *A. cretica* we saw in quantity on the Homalo plain (fig. 139). *Gladiolus segetum* in Crete, as elsewhere, is a cornfield weed. *Urginea maritima* is very common throughout the island. *Pancratium maritimum* luxuriates in deep sea-sand on the coast and is very handsome. Its decorative qualities were appreciated by the Minoans in their frescoes and ceramics.

We made several other excursions on the flanks of the White Mountains. One on the north side, through the village of Murnies, the birthplace of M. VENIZELOS, and beyond through the gorge leading to the primitive mountain village of Theriso (fig. 145), where snail farming is carried on. It was springtime and fruitful of many botanical finds, particularly the small white *Cyclamen creticum*, growing by the thousand. On another occasion in the autumn, with HIATT BAKER, we hired a Ford omnibus and, taking the road to the east, passed through the village of Suda, which still retains on its shop fronts traces of the British occupation. We stopped on the road to inspect a Plane tree (*Platanus orientalis*) said to be evergreen: within a stone's throw we saw other Plane trees of the same species, said to be deciduous. It was impossible to verify the accuracy of this statement at that time, but in the following spring, when I visited the spot again, there was no doubt whatsoever of its truth. The evergreen tree had retained all its leaves during the winter, whilst the other trees were bursting and unfolding their leaves. Crete is reputed to have several such specimens. I know of two, a long distance apart from one another. PLINY, A.D. 70, makes reference to this phenomenon in the following terms: "Nunquam folia Dimittens."

The road skirts the southern shore of Suda Bay to its entrance and then turns inland, passing through several well-to-do villages, and a country particularly fertile with its vineyards and olive plantations, and comes to Frey. Here the road ends and mules are sought for, and until they were forthcoming it gave us an opportunity to visit the church, which according to the legend is famous for its ikon, one of seven said to have been painted by St. Luke, the others being in Russia. Here we added grapes, ripe figs, mutton, fowls, and wine to our commissariat, the wine costing us 10 drachmae the oke, equivalent to 1½*d.* a pint. It was the best we had tasted since our arrival; it was not resinous and of a port-wine flavour and strong. Continuing we soon started climbing, and cultivation gave place to the "maquis" of the hills. We found ourselves on an alp, Placa Courta, near a "Mandra" or sheepfold with beehive stone huts, about 30 feet in diameter with a fireplace on one side. Fortunately for us it was not occupied by shepherds; our own tent was pitched within a wall enclosure. It was well chosen for camping and for the superb distant view it commanded, extending over the country to the coast and beyond towards the north-east to Candia, with Mount Ida rising alone and asserting itself in the East.

The main mass lay behind us, bare, arid and uninviting. Little or no vegetation was apparent, though in fact there are low-growing shrubs stunted in their growth by the wind.

Here we spent three very enjoyable days, confining our operations to the slopes in the vicinity of a peak—Rachee (5,900 feet)—on one of the outer spurs running south-east of the main mass of the White Mountains.

The characters of the plants alter in a very marked degree as one mounts to a higher zone. The familiar Phlomis is stunted in its growth, whilst *Erica verticillata*, which at 2,000 feet altitude is 3 feet high, was here in clumps, as much as 3 feet across, and not more than 4 inches high, with its dry blossoms of a brilliant browny red. It was on this trip we came across a whole colony of Paeonies. At first, as we approached them, we observed what appeared to be a brilliant red flower, but on closer acquaintance the brilliant red was the red lining of the Paeony seed-pod; the seeds were dark blue. There are two species on the island, *P. corallina* and *P. cretica*, both allied to *peregrina*. ANDERSON, in his "Monograph of the Genus Peonia," * calls it *P. arietina* var. *cretica*; he says it was known to PARKINSON in London gardens in his time, bearing flowers of a pale whitish colour, very single, resembling the female "wilde Peiony." It seems to have gone out of cultivation, "the Oxford Botanical Gardens being the sole place where a few years later it was to be found." This was more than a century ago, but in more recent times botanists include it in the large family of *peregrina*. Whatever section it belongs to, *P. cretica* has its own characteristics. MORISON, who described the plant, was quoted by ANDERSON, who says: "Its habit confirms it to be a plant of the mountains having all that woolly like softness in its young stalks and leaves so peculiar to the plants of that island. It comes out of the ground of a pale glaucous green colour, destitute of the ruddy tint so common in the genus. Petals of a beautiful pale blush colour, crisp and lacerated in a greater than usual degree. Follicles almost reflexed when ripe, less woolly, of a lighter colour than those of the variety *arietina*."

P. cretica is one of the earliest Paeonies to bloom, and may be characterized as of dwarf habit. It figures in *Bot. Reg.*, vol. x. tab. 819, 1823, as a deep pink colour.

Two species of Daphne dwell hereabouts, *D. sericea* (syn. *collina*) and *D. oleoides* (syn. *buxifolia*), of white blossoms and very narrow leaves with considerable white on the rim. Both figure in SIBTHORP'S "Flora Graeca."

Still another excursion we made from Canea when we crossed the island to Sphakia on the south coast, through the ravine beyond Askiphu (fig. 146), lying east of the White Mountains. Our intention was to sail from Sphakia round the coast and call at the haven of Lutro where Phenice stood in St. Paul's day, and then on to the mouth of the gorge leading to Haigha Rumeli and Samaria. This was already known to me from its northern entrance, as already described in the preceding pages of this article. Again we made use of the omnibus to take our whole equipment.

Askiphu (altitude 1,400 feet) is on the edge of a circular cultivated plain lying in the hollow of the hills about a mile across. An old Turkish blockhouse built on a high mound stands sentinel above the plain. We were given shelter in the village café, where we set up our camp beds. From here an interesting day was spent near the snow slopes, reached from behind our quarters, where various kinds of bulbous flowers of Crocus, Tulip and Chionodoxa were found in plenty. We continued our journey by mule, gradually rising across the slope overlooking a small valley, where below in the trough lay the old mule track. It was here, we were told, that Yerli Pasha who landed on the south coast with 7,000 troops was trapped by the insurgents, who rolled down rocks from the heights above. We were evidently in a country of other such conflicts, for already lower down the scene of another ambush was pointed out to us. In this case some 6,000 troops coming from the north were overpowered by the islanders.

---

* *Trans. Linn. Soc.*, vol. xii. p. 276.

The altitude at the upper end of the ravine we found was 2,000 feet at its entrance. Here and there it was so narrow that with outstretched arms its sides could be touched. Wall-like they rise vertically hundreds of feet above. In places the path twists considerably, making it impossible to tell where the next turning will be. One seemed to be locked in. Looking up, the sky and daylight are only visible through narrow slits above. At times the gorge opens out into an amphitheatre, a hundred yards or less across, with steep sloping escarpments, sometimes with ledges where the choicer plants are seen growing. Again and again the sides were smooth, rounded, and polished, showing clearly the work of centuries of erosion. In places the ravine was paved, and we were told that after heavy rains as much as 4 feet of water pass through the narrow bed of the gorge. We rambled leisurely downwards, sometimes climbing difficult and treacherous ledges for plants. At one spot where a halt was called near a spring, my brother saw on a ledge high up some particularly fine specimens of *Tulipa saxatilis.*

He was tempted to risk his limbs to collect some of the bulbs and reached the plants with ease, but when he came to descend by invisible footholds he called for a rope, which we were fortunately able to throw up to him ; this he passed round the trunk of a tree, and with its help lowered himself down in safety.

As we emerged into the open the plants and flowers were more plentiful ; we noted among the varied collection : Cypress, *Pistachia Terebinthus,* Phillyrea, all clinging to the rocky walls of the ravine ; Daphne, *Styrax officinale* with its bridal argentiferous blossoms of rare attraction and scented ; *Staehelina arborescens,* a shrub with a laurel-shaped leaf, white on the under side, and a flower like a miniature pink Centaurea ; *Linum arboreum* with a thick stem and amber-coloured clusters. The small plants had all the characteristics of the flora of the Gorge of Rumeli.

At Sphakia we were taken to the barrack of the Civil Guard, where at one time Major BONAKIS was stationed. The captain in charge offered us the use of his office, where on the terrace overlooking the sea we fixed up our camp beds. The ruins of a Venetian castle and towers, the many empty houses, and poor condition of the village shops showed evidence of a troubled past. Formerly a town of 500 houses, it now numbers but some 80 families. Once it possessed a fleet of twenty vessels of square rig ; now all we could see on the shore was one small sailing boat. BONAKIS interviewed the owner to make arrangements to take us round the coast to our destination, but to our regret he reported that although the boatman was willing to take us to sea he could not land us, as the wind was against him ; it was

Photo, A. Baker.

FIG. 142. CAFÉ GROUP AT LAKKOS, CRETE.

The four contorted walking sticks on left are made from *Zelkova cretica*.

[*To face p.* 400.

blowing from the wrong quarter. He pointed to the sea, where beyond the shelter of a promontory we could see the turbulent condition of the waves. The fact was that the Euroclydon was blowing, the same wind which drove St. Paul out to leeward of the island of Clauda and which would prevent us, as it did the Roman galley, from landing at Phenice, lying 3 miles west of the village where we then were. There was nought to be done but return by the same route, the one and only way.

No town is better placed than Canea for a faithful impression of the Cretans and Crete. We shall never regret our ten days spent on the promontory of Akrotiri in early spring. The whole wild promontory, from the sea on the north to Suda Bay on the south, was at its best, gay with a succession of patches of wild flowers, growing under natural rockery conditions in the greatest profusion. In places the countryside seemed to be a perfect Persian carpet of scattered varieties of many-coloured Ranunculi and Anemones. In other places were patches of white, cerise, and pale pink Cistuses; banks of a rich deep amber-coloured Gorse 60 to 70 feet long and from 4 to 8 feet high, and in the foreground broad masses of a mulberry-purple *Lavandula Staechas* flourished. Bees were feasting and humming with content. We passed from joy to joy. In sunny, low-lying places one would come across large patches of the glossy rosy petals of *Tulipa saxatilis* looking all the richer against their deep green leaves.

The calm sublimity of these Eastern cloudless nights, the myriads of stars, the golden rays of early morning, the sapphire blue of the seas, the exquisite beauty of the distant snow-clad White Mountains, with their ever-changing evening tints telling the ending of another day, will always remain pleasant memories of happy hours.

On this promontory is situated the Monastery of Haigha Triada; with HIATT BAKER we camped under canvas in a cypress grove in the precinct of the building. It was an ideal spot within easy reach of ripe grapes and figs, and the hospitality of the Hegumenos of the monastery. He supplied us with wine, chairs, a table, and a servant. We tramped across the hills to the east, descended into a narrow gorge by steps hewn out of steep rocky slopes to the ruined and deserted monastery of Catholicos, wedged within the rocky walls of the gorge. It has many times been rifled in the past by corsairs. It was here that we secured the bulbs of the true *Lilium candidum* growing on a ledge, relics, one supposes, of the days when the monastery was inhabited 200 years ago or more. *Dianthus arboreus* was growing high up, overhanging the rocky face with a stem as thick as one's wrist. The sea was below us; at a spot from which we bathed in a tideless deep pool we noticed the same characteristic conglomerate ledge of rock above the coastline, seen on the south coast on our way to Sphakia, but in this case instead of being a 40-feet ledge it was 10 feet thick, indicative of the great upheaval that took place along the coast sometime in the late Roman period.

There are several species of Cistus on the island with their variations to add to a confusion which exists with this genus. *C. creticus* is said to be a sub-section of *villosus*. TOURNEFORT calls it *C. ladanifera cretica*. From the earliest of times it has had the reputation of yielding laudanum, the Cretans exporting it to Egypt in the days of the Pharaohs. GERRARD quotes BELLONIUS (p. 1291), and TOURNEFORT in less quaint language not only describes the method of collecting the resinous wax but gives a sketch of the instrument in use for this purpose (see fig. 137). He says: "*Cistus creticus* is said to yield laudanum although more than one species in turn has been made to bear the name ladaniferus." TOURNEFORT'S account of the gathering of the landanum is interesting. He says: "Travelling towards the sea we at length found ourselves among these dry sandy hillocks overspread with the little shrubs that yield the laudanum. It was in the heat of the day and not a breath of wind stirring; circumstances necessary to the gathering of laudanum. Seven or eight country fellows were brushing the plants with their whips; the straps whereof by rubbing against the leaves of the shrub licked up a sort of odoriferous glue sticking on the leaves; it is part of the nutritious juice of the plant, which sweats through the texture of those leaves like a fatty dew in shining drops, as clear as turpentine. When the whips are sufficiently laden with this grease, they take a knife and scrape it clean off the straps, and make it up into a mass, or cakes. This is what comes to us under the name of laudanum, or labdanum. A man that is diligent will gather an oke (3 lbs. 2 ozs.) per day, which they sell for a crown. Unpleasant work rather than laborious, because it must be done in the sultry time of the day and in the deadest calm."

It will be observed in the above transcript that the word landanum is spelt with a "u" instead of "n," a mistake I attribute to the printer of the original. Pure ladanum or landanum consists of a resin and volatile oil and continues to be exported to Egypt, but no longer to the Continent of Europe. It possesses stimulant properties and was formerly a constituent of some plasters for rheumatism and employed internally as a pectoral and an astringent in catarrhs and dysentery, and is not to be confused with laudanum, a product of the Poppy.

My own experience of Gum Cistus is that many years ago, when on horseback, and having occasion to cross a spur of Murad Dagh from Kutayieh to Oushak in Asia Minor, the track took my party through brushwood, much of which was *Cistus ladaniferus*. I found on dismounting that my riding breeches had collected the gum which had exuded from the Cistus, nor could it be removed by any method known to me or the natives.

Only some six species of Campanula have reached the island, and of these but one came my way, *C. cretica saxatilis* (illustrated in JAUBERT, plate 392). It was found on the rocks at the east end of the Akrotiri near the entrance of Suda Bay. As I have not seen the plant in blossom, and FARRER has, I cannot therefore do better than quote from his very jubilant description, where on p. 197 he says "that it is a species of quite pre-eminent beauty imitating *C. Raineri* in all its habit and beauty, and perhaps actually threatening the supremacy of its almost unsurpassable model: the shoots upon their stems of an inch or two carry as many as five flowers; these flowers themselves strike out a different line of grandeur, tubular deep bells of the richest sapphire velvet and amplest size." As the plant has its habitat on the warm coastline, there is a danger that it may not like our cold and damp climate. It is allied to *C. mollis*, found wild in rocky situations in Syria, Sicily, and Spain, and figured in *Bot. Mag.*, vol. 12, plate 404, and compares very favourably so far as size and leaves and habit with JAUBERT'S figure.

On the way to Sternees (the village of wells) from Canea, shortly after passing the highest ground on the road, we stopped the car to visit an underground chapel. Crete has its chapels in all sorts of odd places. Invariably there is what they call a Monasteri on every important hill; or on a ledge in what appears from below to be a very inaccessible place; or on the rock face of a mountain hidden away. They all have their altars, ikons, candles and money-boxes, and when these are not provided, one sees coins in earthenware or metal plates. On this occasion the chapel was within a walled enclosure and on the main road. The attraction of the place, so far as we were concerned, was a large colony of *Orchis fragrans* growing in a somewhat damp hollow sheltered by trees.

Crete is quite rich in Orchidaceae. In our wanderings we came across many of the familiar species such as *Ophrys lutea, aranifera, bombyliflora, fusca,* and *apifera,* and *Orchis pallens, papilionacea, lactea,* and *longibracteata.*

At Knossos and Haigha Triada we saw the ruins of temples and cities which hummed with life and intellect thousands of years ago. The island and museum also show traces of occupation of more modern times when Saracen, Venetian, or Turk in turn took possession and ruled or misruled.

For the last three centuries Crete has been subject to the Ottoman; for the last century it has been the scene of revolution after revolution until in 1914 it was freed, and now forms part of the Republic of Greece. This is as it should be, for Cretans are allied in race, religion, language, and tradition to the Greeks. They now have an opportunity of developing the natural resources of their island, freed of misgovernment and the continual strife against a foreign ruling minority. There are now no Turks on the island. By the Treaty of Lausanne they were deported and have been replaced by 30,000 Greeks of Asia Minor.

We saw many of these refugees in our wanderings in their new settlements, which are planned on well-conceived lines, with red-tiled cottages and well-proportioned streets. Many of them we saw working their fields, tending their vines and orange groves, and came away with a feeling of great admiration for the work of the Refugee Commission and the League of Nations which has helped Greece in handling the one million two hundred thousand refugees who were suddenly dumped in their midst. We also came away with the feeling that, however hard and cruel the deportation of these populations was, to Greece it means greater prosperity and future happiness for the refugees. It has consolidated them.

The refugee Greeks from Asia Minor have brought with them improved methods of pruning and new methods of drying the grapes which have resulted in an increased quantity of fruit and, still more important, a higher quality of raisin. On the London market Cretan sultanas to-day realize a higher price than those of Smyrna.

I have indicated that Crete is deficient in forest scenery; on the other hand, it is rich in extensive olive plantations. It is estimated there are nearly 14 million trees under cultivation, yielding an average crop of 30,000 tons. The large earthenware vessels and the extensive storage accommodation set apart in the palace of Minos at Knossos are surely some evidence that oil was the chief source of revenue to Minos its ruler. Frequently one comes across primeval trees planted before the Venetian occupation (fig. 147). The trunks are short, distorted and thick, attaining a circumference of 26 to 30 feet. They are twisted and hollowed out, and on their surface bear remarkable protuberances and cavities. The soft grey-green of the olive foliage is very luminous, and makes a pleasing contrast to the dark greens of other trees. The ripe olive has a very palatable and pleasing taste and is, with bread, the chief food of the natives. Olives are associated in my mind with the black olive preserved in oil, and when I first saw the natives bringing olives out of their waistband I came to the conclusion that their clothes must be saturated with oil, a delusion which they soon set at rest when I was given some of them, to find that the olive as they eat it is soft and does not exude its oil until it becomes more or less over-ripe and rotten.

The middle and eastern sections of the island have been and are still rich in vines of many varieties. The export of fresh grapes to Egypt alone is annually 1,000 tons. They are packed in neat baskets of about 30 kilos each. The price realized averaged 3 drachmas a kilo. In Candia one Sunday we reckoned there were 12,000 baskets on the quay ready for shipment. The famous Malmsey or Malvoisi wine of Elizabethan days which our forbears so much appreciated came from the district of Melavese. The wines from this district still enjoy a reputation. Some were very much like port and sherry, but the so-called Cretan wine was very earthy. The monasteries have the reputation of having the best. The flavouring of their white wines with rosin we thought unpleasant.

Citrons are a feature of the island; they are pickled in brine and yield an export of 1,200 tons. A factory has lately been established for the manufacture of candied peel. Quinces are also a fruit of the country, as the word Cydonia indicates. They are eaten raw, just as we eat apples, though I imagine they are more used as a preserve. The seeds are used medicinally as an astringent for throat affections.

FIG. 145. IRIS GERMANICA, PLATANUS ORIENTALIS AND STYRAX OFFICINALE IN S. CRETE

[To face p. 401]

Fig. 144.—Tulipa saxatilis in Crete

Photograph by Dr G. Maly.

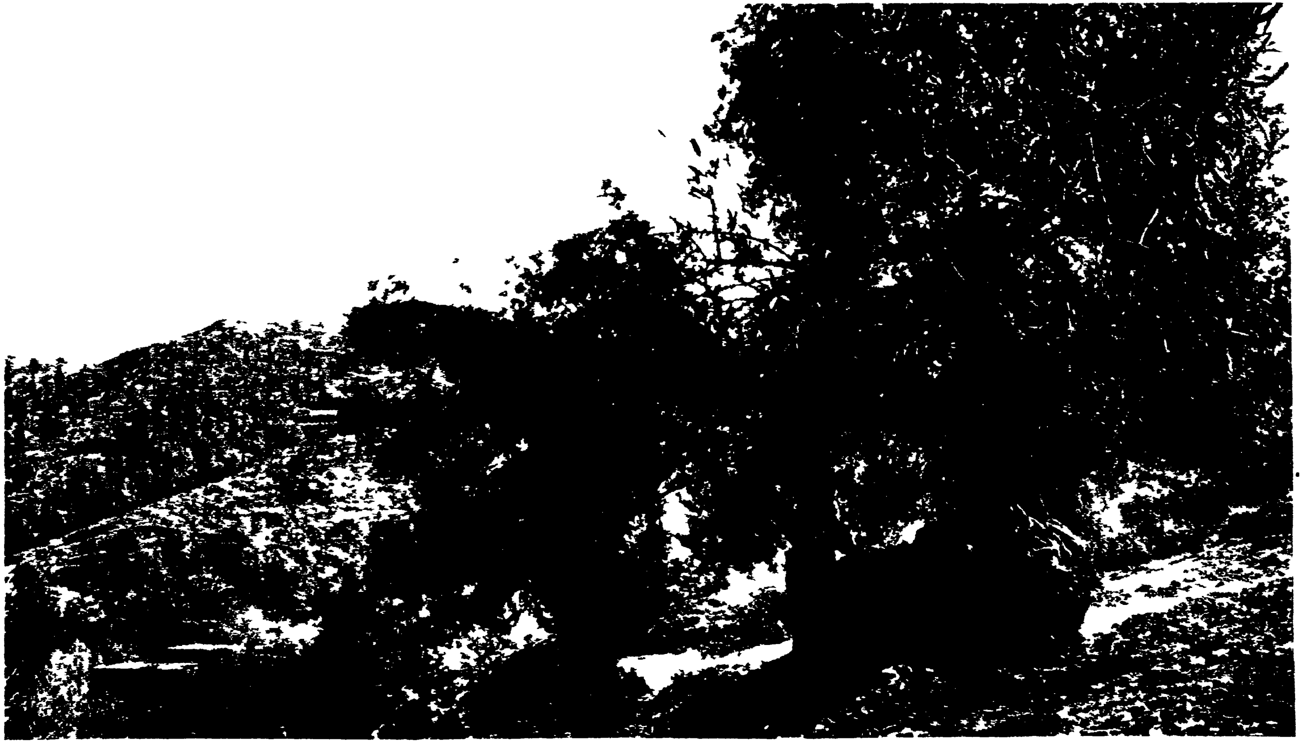
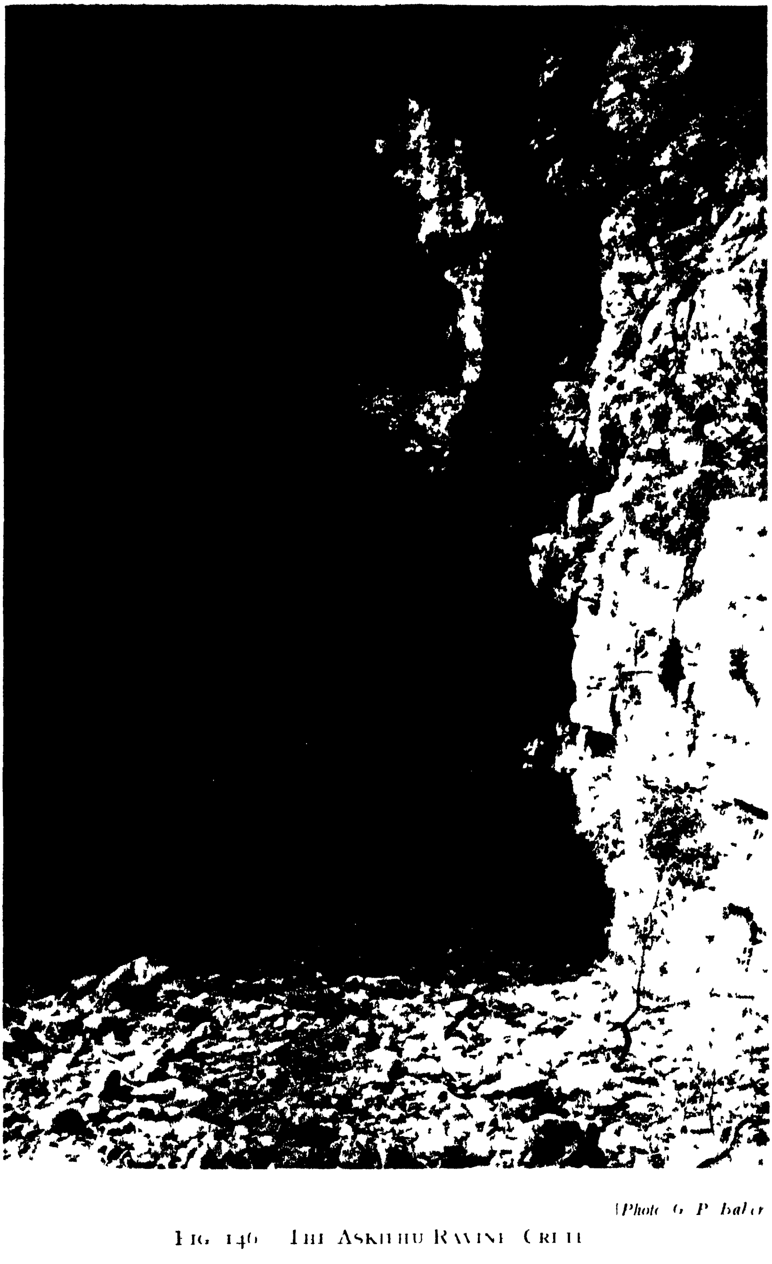


Photo G P Baker

FIG 145 OLIVE AND HILL TERRACES THERISO CRETE



[Photo G P Baker

FIG. 146 THE ASKIFOU RAVINE CRETE

On my three journeys on the island I have been fortunate in being there when grapes, figs, and oranges were at their best.

We took leave of our Canea friends with expressions of mutual regret, and motored to Rhytimo by the coast road. Thence by mule we took a high-level route round the west and south flanks of Mount Ida, reaching our destination at Candia on the evening of the fifth day.

The previous year, when HIATT BAKER was with me, we made this journey by steamer. Our intention was to make the ascent of Ida. The road from Candia takes one by motor car up the fertile vine-clad valley of Melavese to the village Varvara near the watershed. We turned off to the right and joined a newly made road which had not yet reached the stage of being metalled. The gradient in the descent was steep, with many hairpin bends, furrowed as though a deep plough had passed through its surface.

We stopped at the village of Yeryerree (altitude 2,000 feet), on one of the south-east spurs of Ida. Here we were received by the priest of the village, who acted as an intermediary in the search and bargaining for mules. He expressed a wish to join our party, assuring us that he not only knew the way, but would be able to provide our larder with game.

We bivouacked in an olive grove, a strong, hot wind blowing all night. The usual route is the mule track, which. traversing the foothills on the south-east slopes of the outlying mountains of the main massif and passing by the monastery of Frondisa, proceeds thence through the village of Vourisa. Our cheery young priest, however, led us into the mountains at the back of the village. This route may have been longer, but it was decidedly more interesting, for we rode through belts of varied vegetation and forests, thicker and more numerous than on the other route. We came across a number of charcoal burners with their laden mules and ultimately emerged through the hills to the Nida plain, whence we rode across to the slopes on the other side above a "Mandri," where camp was pitched.

From our camp we overlooked the plain 150 feet below us: another of these upland basins so characteristic of Crete. It is about two miles across from west to east, level as a cricket ground, encircled by rounded hills in front, while on each side of and behind us were the steep north slopes leading to the main north-east ridge of Ida.

In the spring of 1925, when I first saw the plain from this same site, one could follow the green of this basin into the hollows and valleys between one hill and another. Now in September the colour from green had turned to an earthy colour and the lacustrine effect was lost. The plain is a great pasturage for sheep and goats, now bare of all vegetation save the sheep-nibbled turf, so thick and close as to give the impression that a mowing machine had passed over its surface. During the winter months to the end of April the plain is covered with a blanket of snow, which on melting passes through subterranean channels to find outlets in the foothills of Ida. In and among the outcrops of rock to be seen here and there on the plain, one may come across an interesting plant protected from the goats by the dense stems of some bush, or by the spines of a bush such as *Berberis cretica*. It was here we collected *Arum creticum*, quite an oddity, but not without interest; it has a mustard-yellow spathe ranging from 6 to 9 inches long; the spadix is a reddish-orange. *Berberis cretica* has very cruel-looking long spines; its yellow blossoms are set in close clusters of small leaves, always growing from the fork in its lateral stems; the thorns project beyond the leaves and blooms, and thus give protection from the depredations of the goat. The red colour of the stem of this Berberis is its only merit, which in winter is attractive. The fruit is black, but we found a variety having red berries.

With less spiny species such as the Ilex Oak, we often came across some good examples of the work of a topiarian goat. One would never credit their long reach unless actually seen. Standing upright on their hind legs they easily reach 8 feet, and crop a bush, leaving it with all the grotesque distortions of miniature Japanese conifers.

Near by was a tiny chapel, built at the expense of some religious devotee for the benefit of the shepherds, where at intervals during the day a child from the nearest Mandri rings a bell, not for any service in the church, but rather to give the shepherds of the plain on the surrounding hills an opportunity of offering up a prayer, reminding us of that well-known picture "The Angelus," by MILLET. Occasional services, we understood, were conducted by a visiting priest.

Here also are the drinking troughs, visited during the day by children and women who cross the plain from various camps with their donkeys to replenish their pitchers, for the fountain here is the only source of supply for the shepherds.

Above our camp, a fifteen minutes' walk takes one to the Idaean cave with its oblong stone sacrificial altar near the entrance. It claims our attention for its mythological tradition as being the place where the infant Zeus was nurtured. A steep descent leads to the cavernous interior whence so many antiquities have been extracted.

In 1925 the route taken in the ascent of Ida lay immediately behind the camp, and we crossed the slopes above the Zeus cave. I was accompanied by a German zoologist who had visited my camp the previous day. He depended on the shepherds for shelter and food, but on this occasion shared with me my tent and food. We scrambled up the steep face of friable rock and screes, in places kicking footholds up the long tongues of snow leading to the ridge above. I reckoned it was a climb of 1,500 to 2,000 feet. Once on the ridge our pace was considerably accelerated by the loose flat stones paving the route for some distance along it. Large areas of the rounded surface of the ridge and all its declivities, small valleys, and crater-like depressions were filled with snow. It was in good condition and added much to the comfort of walking. At the edges of some of the snowfields where the snow was melting we found the flowers of bulbous plants I had come for; they were in all their splendour under the most favourable conditions of sunshine and stillness.

Crocuses, Tulips, and the *Chionodoxa* (a name so appropriately chosen) were bursting into bloom through the very snow itself, and looked like many-coloured jewels on a white field.

The upper slope of Ida has its flora specialities, poor though they be. Apart from the plants already mentioned the following should be added: *Gagea foliosa, Corydalis rutaefolia, Lithospermum incrassatum, Alyssum idaeum, Myosotis idae,* and a yellow Composite.

In 1926 we climbed Ida on mules and were guided to a small valley having its entrance on the same slopes that we were camped on, but nearer the gap to the Nida plain on its southern end. An upward traverse from our camp took us in half an hour to the entrance of the valley up which we continued to mount by easy gradients. We put up many coveys of partridges and a few hares, some falling to the guns of the priest and our porter.

As we approached the head of the valley it narrowed (altitude approximately 6,000 feet). Our mules climbed up the left-hand face of a mountain, zigzagging as they mounted until we came to a mound forming one of the shoulders of Ida, and near the spot where in the previous year I had turned back with my German companion. We found ourselves within 500 feet of the summit of Ida, lying immediately to the north-west with a gap below connecting the two summits. It was littered with stones of varied sizes. The vegetation, such as was visible in the autumn of the year, was confined to a spiny *Astragalus creticus* with a few blossoms of a tiny white *Colchicum* allied to *pusillum*. Seen from our position the final cone of Ida appeared as a smooth surface and so we found it to be. We descended to the gap and began again mounting the final slope; it was less steep and less broken, probably the result of the winds sweeping down as with a gigantic broom.

The actual summit of Ida covers an open space with rounded sides. Fortunately there was no wind. We had extensive views, and could follow the coastline on both sides of the island. The whole range of the White Mountains to the west is set in a soft and mellowed eastern atmosphere. Candia and the coastline in the direction of Suda Bay is also visible. The island of Clauda to the south stood out clearly in the Libyan Sea.

On the summit is a so-called monastery, Haghios Stavros (The Holy Cross). It is a tiny hovel constructed of stone slabs laid one upon the other in the same primitive way as the shepherd's Mandra; mortar had been used in some parts of the structure.

We had to crouch low to enter the building and found tapers and ikons. The building is surrounded by a walled enclosure serving the double purpose of protection to our mules, and a well with water for us. Pilgrimages are made once a year, when a service is held, followed by dancing within the enclosure.

We returned to camp on foot by the terraced N.E. ridge already known to me. We used our axes for digging and invariably found the largest and best bulbs near the foot of some spiny shrub out of reach of partridges, who are fond of them, as we saw from their scratching.

Another day was given to plant hunting before we struck camp and returned to the main road by way of Vourisa, Frondisa, and Yeryerree where a motor was waiting to take us back to Candia.

From a climatic standpoint the rainfall of Crete may be classified as belonging to the South Mediterranean region, where during November and December the rains are torrential, averaging half its annual fall; from January to April the rainfall gradually diminishes and is less violent. Then comes the continuous drought of summer. For the next six months it is estimated that the rainfall is little more than 10 per cent. of the annual fall.

The temperature of the island is by no means as oppressive in summer as are the western islands of the Mediterranean. The island comes under the influence of the prevailing cool breeze from the north-north-west, characteristic of Turkey from the Dardanelles and southward, to which must be added the influence of snow on the mountains usually up to July and sometimes later. This wind increases in velocity as the day advances, dropping towards sunset. It is the Euroclydon, St. Paul's wind, which maintains its character to this day.

The island is subject to the Sirocco wind, and when this comes the fiery atmosphere is charged with dust from across the African coast, the temperature rising from a normal 70° to 100° F. In cultivated areas this wind is at times disastrous, especially to vineyards and olive plantations.

I have not experienced the Sirocco, although I know what it is to be caught in a rainstorm on the upper slopes of Mount Ida. For twelve hours my tent was battered with sand and rain; at intervals during the watches of the night, when there was a lull in the storm, I could hear the Gods sounding the charge for a further lashing against my squatter's tent. Fortunately during a period of lull I was able to take in a reef by lowering the canvas to the first joints in the upright poles fore and aft. I realized that Zeus was against me; I was not wanted on this sacred hill, so at daybreak, striking tent, I sought refuge in the small chapel already occupied by my man.

The wind-swept slopes of Mount Ida are proverbial; vegetation is confined to the hollows and crater-like depressions called *Katavothron*, through which as through a giant funnel the melted snows find outlet. In one of these hollows sheltered from the wind our party had lunch. We collected amongst other things the ripe seed of *Prunus prostrata*. This fascinating plum is found in full bloom in May to June; the colour is a deep cerise and white; the stem, thick, contorted and stunted, shapes itself to all the irregularities of the rock up which it is growing and never projects beyond a few inches. Near by we found a large clump, 30 inches across, of *Onosma erectum* with its bugles of golden blossoms on upright stems. If by chance one finds a plant growing in an exposed wind-swept position it will be stunted .as was the case

Photo G P Lider

FIG. 147—OLIVE TREES IN CRETE

[To face p 408

on the White Mountains. *Erica verticillata* grows only a few inches high, notwithstanding its possession of clumps 3 feet across. The same species 5,000 feet lower down the mountain grows 3 feet high.

I found the Cretans of the hills a simple people of sound morals. It is proverbial that no other people of Europe, and probably in the world, have such a strict interpretation of sexual morality as the Cretan. Jealousy is unknown, Cretan girls and women must, like Caesar's wife, be above suspicion. Forgetfulness of the duty which the married sexes owe one to the other's honour is speedily visited with death. On the other hand, vendetta is still known amongst the highlanders in the province of Sphakia, a people who are a law unto themselves.

The " pappas " or priests of the villages have great influence, they are respected and looked up to as head of the community. The church has an enormous moral and religious influence on the people. We were there during the 40 days' fast of Lent, and it was very apparent amongst the peasants that so many would not touch meat or any food in which there was a taint of animal fat.

Every village has its public telephone and its school, very elementary, as far as I could judge.

The Cretans are very hospitable, as I can testify from personal experience. One may travel throughout the island living on the hospitality of the monasteries.

NOTE.—The following works have been used in connexion with this article:

HALACSY. " Conspectus Florae Graecae."
TOURNEFORT. " A Voyage in the Levant " (1718).
RIKLI, M. " Kreta und Sizilien." Vegetations Bilder, 13 Reihe, H. 1, 2.
SPRATT, Capt., R.N. " Travels and Researches in Crete " (1865).
RAULIN. " Histoire Naturelle de l'Ile de Crète " (1869).

AN INVESTIGATION OF ENGLISH WALNUTS.

By H. V. Taylor, O.B.E.

An account by Howard Spence of the production of walnuts in the United States has appeared in the *Journal of Pomology and Horticultural Science*, Vol. IV, No. 1, July 1924, but it is necessary to remind readers that the walnut trees planted when that industry was first started were those raised as seedlings from planted nuts. This method of propagation has since been superseded, and present plantings for commercial purposes are confined to trees that have been raised by budding or grafting scions taken from trees of proved quality. It is largely from these plantations of grafted trees that come the very large supplies of walnuts—43,000 tons in 1927—which have made California an important walnut-producing country. Although the best walnuts in France and Italy are produced from grafted trees, in the continents of Europe and Asia walnut trees in the main are raised by sowing nuts—either those of good appearance or those taken from trees that have a good record—so that each tree raised is a new seedling on its own roots. In common with many fruit trees, the walnut cannot be relied upon to breed true to variety and in some characters the seedling trees exhibit variations, though it often happens that there is a certain family relation to be seen in many respects.

This variation of character is unfortunate, for though a really good variety may have been discovered and grown by this method of propagation, there is no propagation of the exact variety but a continuous production of new varieties, many of which are of poor type.

The good characters of the original parent are not lost but become spread out amongst its progeny, in which one may retain size, another flavour, and a third quality, and show other latent evidences of varied ancestry.

In his article "An Inquiry into the Quality of English-Grown Walnuts" in the *Journal of Pomology and Horticultural Science*, Vol. V, p. 223, Spence defines the quality of walnuts for commercial purposes by the following characters: size, colour, contour, thickness of shell, sealing, percentage of kernel, astringency and flavour. Thus a good dry walnut should be of a size weighing from about one-third to one-half of an ounce, of light yellowish-brown appearance, with a moderately smooth, regular, not deeply pitted, and reasonably stout well-sealed shell. The kernel should average from 45 per cent. to 50 per cent. by weight of the dried nut, and in the unpeeled state be not astringent; the flavour to be mild, sweet (not sugary), and essentially nutty. Walnuts of these standards are very largely produced in California and many parts of Persia and France and elsewhere, and some may exist in England.

Starting in 1924, an endeavour has been made during that and in each succeeding year to locate trees in England that are producing nuts of this quality. At the same time imported walnut stocks have been planted at East Malling so that the material should be available for grafting as soon as the best trees have been located.

The poor weather conditions of 1924 were evidently unkindly to this fruit, which is a lover of sunshine, for all the nuts sent in during that year were described as of poor quality and none could be considered good enough for propagation purposes. The season of 1925 was generally more favourable and in consequence the nuts analysed out better—in fact a few trees were found that produced nuts of more than average merit; yet none of these quite reached the desired commercial standard. All the good characters hitherto referred to have been found in English nuts taken collectively, but so far they have not all been found present in the same nut. Worcestershire, Surrey, and Norfolk and one or two other counties have yielded promising walnuts. One of the best trees located is in Worcestershire. This is a 200-year-old tree (fig. 148) which has an annual average yield of 8 cwt. and has been known to yield 45 bushels. The quality is very good.

The large nuts usually have inferior kernels, or contain far too high a percentage of moisture, whereas the better quality nuts have frequently lacked size. Walnut trees flowered well in 1926, but the crop was ruined by late frosts and high winds, and only in isolated areas did any considerable quantity of nuts mature; nor were the results of the investigations in 1927 and 1928 more successful, for none of the nuts investigated showed any special merit.

This year the Ministry of Agriculture and the Royal Horticultural Society are co-operating, and as a result the Society proposes to hold a Walnut Show on November 19, full particulars of which can be obtained from the Society. It is hoped that this will result in bringing forward nuts of higher standard than have been discovered hitherto, for undoubtedly there are at least some few walnut trees in England of real merit.

In the meantime activities in other directions are well forward. Nuts from all the four corners of the earth have been collected and analysed, and in many instances scion wood taken from extra good trees has been obtained from France, California, Canada, Italy, Persia, North Africa, etc. Seedlings from some of the finest foreign walnuts have been planted and will be tested out. There is a risk (probably a real one) that many good varieties of foreign countries may prove quite unsuited for growing in this country, in which case the research worker will be compelled to work largely with the existing English nuts, so the need for discovering the best tree is all-important.

In the meantime, in addition to testing experimentally some half-dozen English and twenty to thirty foreign types, the East Malling Research Station has done some very valuable work on vegetative walnut propagation and undertaken an investigation into the important question of stocks, so that some real progress may be recorded.

ROADSIDE PLANTING.

By A. D. C. Le Sueur, F.S.I.

[Read February 12, 1929; Sir William Lawrence, Bt., in the Chair.]

For generations our roadside trees and hedges have been celebrated for their beauty, and this reputation will doubtless be upheld by by-roads and lanes for many years to come. The tremendous increase in road transport is, however, altering the main roads out of all recognition. They are rapidly being transformed into long monotonous stretches, treeless and hedgeless, bounded by wire and concrete and completely devoid of beauty, of shade from the sun or shelter from the wind. On the Continent the importance of road decoration has been realized for generations, and this is the reason why the practice of roadside planting has become so highly developed in such countries as France, Germany, and Austria. France, for example, has had centuries of experience, as her first regulations on the subject date back to the year 1552. In the United States trees were regarded as enemies for generations, and it is only in the last fifty years that their great aesthetic value has been recognized. During this period the cultivation of the " shade tree " as a material asset has reached a pitch surpassed by few other countries.

It is only of recent years that work of this kind has been seriously taken in hand in Great Britain, and this work, the decoration of our existing and future arterial roads, is probably one of the most difficult types of ornamental planting which can be found. We have to decorate —that is to say, bring into greater prominence—a road which may be already far too prominent, and is generally completely out of harmony with its existing surroundings. Successful decoration is also handicapped by the pernicious " ribbon " system of building development which in many cases can only be described as an outrage to nature. The Bath road at Cippenham near Slough furnishes an excellent example of this type.

Except to the cubist, the straight line is an abomination, and we should attempt to conceal it as far as possible. The problem of decoration is, therefore, not entirely to be solved by the mere planting of rows of trees. Certain experts very rightly condemn the practice for country roads, saying that it is only suited to the town and suburb, but we must remember that trees are planted in streets in rows because space is valuable, and this also applies to the arterial road in the majority of cases.

Before proceeding any further, it may be as well to consider the question of whether road decoration has any use outside the purely aesthetic. In the first place, an attractive highway undoubtedly tends to increase the value of adjoining property. The trees which form the backbone of all decoration of this type shade the road to a certain

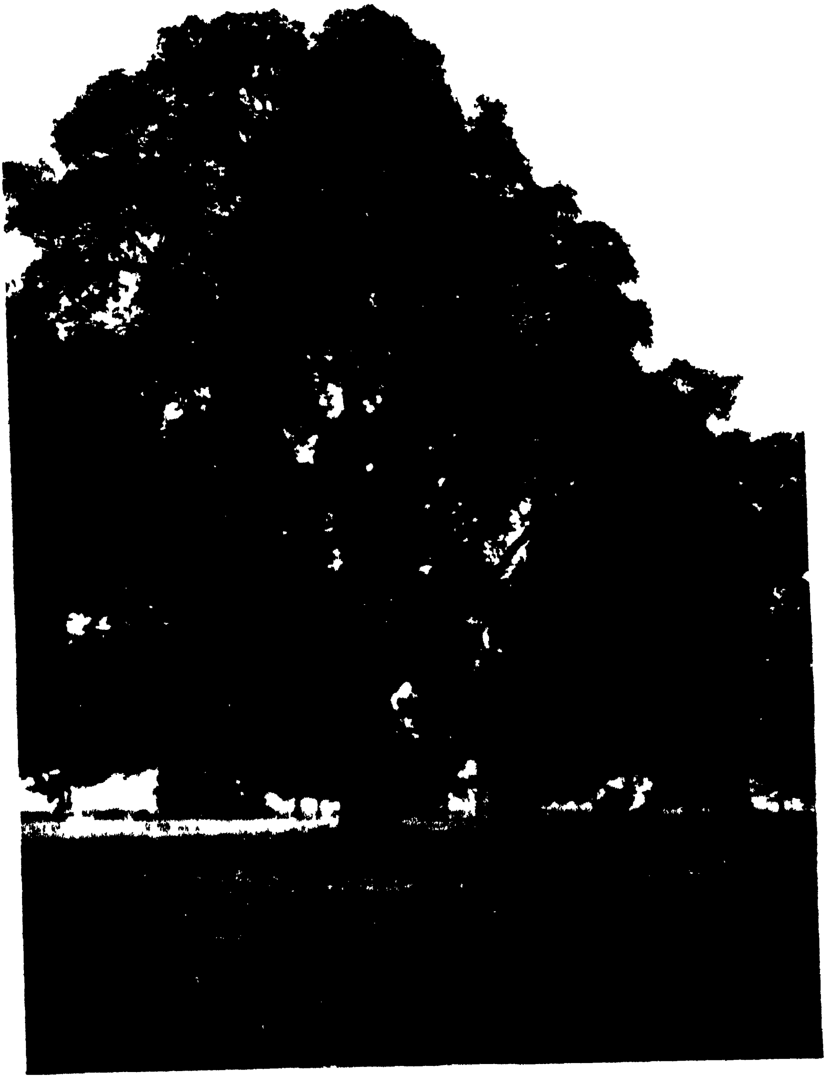


FIG. 148.—WALNUT IN WORCESTERSHIRE.

[*To face p.* 412.

extent, protect both the road and the users thereof from the sun, and make travelling more pleasant. During the winter they act as a windbreak and, above all, assist in the prevention of snowdrifts. They also help to cool and purify the air.

It has been suggested that roadside planting will add to the timber resources of the country, but I do not think we need take this idea very seriously.

Of course there is the other side of the question to be considered. Objections to tree planting may be received from the motorist, who anticipates skidding on the leaves as they lie on the road in the autumn. This is a sound objection, up to a point, as a car can and will skid on leaves, especially very large ones. Mr. DALLIMORE suggests that some species have leaves on which tyres are more liable to slip than on others, and I think there is a good deal in this, but the tree-loving motorist who will lend himself and his car for experiments in connexion with this theory has yet to be found. The danger of skidding, chiefly to be feared in still wet weather, can be considerably diminished by planting at fairly wide intervals, and, when possible, planting most of the trees on the leeward side of the road—that is, in this country, on the eastern or northern side.

Another motorists' objection to trees is the danger of crashing into them if he accidentally leaves the road. This danger has been largely provided against by some highway engineers, who have seen fit to erect a type of curb which is guaranteed to turn any car over long before the tree line is reached. There are exceptions to this, the chamfered curbs in the North Riding of Yorkshire forming a notable one.

The difficulty of seeing trees in the dark can be obviated by adopting the German method of *Schutzbaumstein*, or tree-protection stones, which consist simply of a whitewashed stone or block of cement fixed in the ground on the road-bed side of the tree. Trees on the outside of a bend may have a patch of whitewash or paint on the trunk, a common practice in France.

There is no golden rule for roadside decoration, each road must be dealt with in sections, and each section on its own merits. This work is as much a public enterprise as the improvement of the road itself. It should not be considered as an unimportant factor, which can be dealt with at any time, but should be taken into account before any engineering work is started.

There are many things to be considered, far more, in fact, than the average highway engineer ever realizes. In the first place we must inspect such trees as are already standing, and carefully note the species, size, age (if it can be ascertained), general character, and decorative value. Soil conditions are most important, especially if the top soil has been, or is to be, removed. Subsoil is quite unsuited to tree growth, and in such situations the introduction of new soil would be essential. Chalk cuttings, as found in Kent, would be particularly difficult to deal with, but, fortunately, this is not necessary, as the contrast of green and white is sufficiently decorative in itself, and the possibly excessive glare of a large expanse of white is soon toned down by the action of weather and the incursion of the ground flora peculiar to this formation.

Another point to be considered is the question of overhead wires and cables. The presence of these is often the cause of appalling tree butchery, and if they are permanent, the establishment of trees in the vicinity is a matter for careful consideration.

The width of the available planting area must be ascertained, i.e. the distance between curb and fence, and at the same time the character and method of use of the land immediately adjacent to the road. Possibly the most important point of all is this general character of the surrounding district. Included in this are such things as the extent and type of views from the road, special objects which might be of interest, others which require screening, or those which could with advantage be opened up. Climatic conditions are also important, especially as regards prevailing winds, their force and general direction, whilst we must also take into account the local flora, the possible damage by insects, and, still more possible, damage by a certain section of the general public.

You will see from this that before any planting plan or choice of species is made a very considerable amount of preliminary work ought to be done.

With regard to what we might term the general scheme of road decoration, I am of opinion that, as a general rule, we should follow that school of landscape work which depends for its effect on the harmonious whole, and with this object in view we should, as I have already suggested, regard the road as something to be blended into its surroundings rather than made to stand out like a bed of geraniums in a public park. The desired object cannot always be attained, but it should certainly be worked for when possible.

To deal with the matter on a small scale is a mistake: 90 per cent. of the users of the roads are motorists, and speeds under twenty miles an hour are unusual. We should aim for the comment "What a beautiful stretch of road!" rather than "Did you see that yellow bush about 200 yards down on the left?" This does not mean that small details should be ignored, as it is only by detail that one builds up the whole.

If a system of blending is adopted, it is necessary to confine planting to species which, if not indigenous, conform closely in appearance and habit to the flora and sylva of the district. In this way roadside planting differs from street planting. In street planting the surroundings are completely artificial and so incapable of incorporation that any species can be used effectively, whether exotic or not.

As regards the actual systems which may be used, these might roughly be divided into three :—

(1) The balanced line.
(2) The unbalanced line.
(3) The parkway system.

The balanced line, consisting of two rows of trees having no particular connexion with their surroundings, is the system which has been most commonly used up to date. It appeals to many, as it calls for little artistic ability and is easy to execute. The result, however, is often far from satisfactory, and it would be very desirable to find some method of modification or variation, as, owing to the comparatively narrow " ribbon " roads which are now being driven through the English countryside, some method based on the line is bound to be the system most used in the future.

The decorative scheme of such roads would be made considerably easier if the road authorities exercised their right of taking up land adjoining the actual highway to a greater extent. There would be no need to buy large strips. An occasional piece of land, strategically placed, and perhaps only 30 yards by 10 yards, might make all the difference on half a mile of road. Moreover, a road winding ever so slightly is graceful, and can impress by itself. The mathematically straight roads now being constructed need more special features than an equally straight line of trees to make them things of beauty.

The balanced line can, however, be effectively used in certain cases:—

1. Where the roads though straight are undulating, and converge on some prominent point. An example of this can be found at Cirencester, in Gloucestershire, where roads of this type converge on the tower of the parish church.

2. It can be used in flat country, where the majority of hedges run at right angles to the road, or where the fields are so large that an obtuse or acute angle is not very noticeable. In such cases the general effect is of a not unpleasing chequer-board type. Here the trees should be in proportion to the enclosures, large trees where the fields are large, and small where they are small.

Straight lines are not particularly effective in very bare flat country, as they have nothing in common with the natural scenery of the district. Occasional trees and hedges would appear to be more suited to this type of scenery. Let us take, for example, the poplar-lined roads of Northern France, Belgium, and Holland. Although these are striking at the first view, a motor run of half an hour or so brings on a weariness born of monotony.

Secondly, we come to the unbalanced line, the aim of which is to plant, or as far as possible to preserve, the roadside in such a way that it is in keeping with the surrounding district. This, when it can be done, appears to be the most satisfactory system to practise. It affords scope for considerable artistic ingenuity, and may call at times for co-operation with adjoining owners, a co-operation which in many cases should not be difficult to obtain. Far more use can be made of shrubs or hedges by this system. A preliminary survey before the land is acquired or operations start is absolutely necessary, in order to ensure the preservation of any valuable feature, such as an old hedge or clump of trees. Satisfactory decoration for a considerable stretch of road may be found in a piece of woodland or a clump of old pines on private property, or near cross-roads by the planting or natural growth on another road some distance away.

We may consider the broken line at this point.

To break up lines by planting only a few trees at a time is possible, but requires care, and depends very much on the surrounding landscape for its success. It is satisfactory if other trees or hills can be seen through the openings at not too great a distance. This method is particularly suited to unenclosed country. These lines or sections should not be extensive, and should be set out of line as far as possible. Trees should be set close enough to show their connexion with the unit, and where single trees are used these should be of a rather spreading type. An occasional low-growing evergreen, at irregular intervals, will help to do away with any idea of bareness.

The broken line is possible, and preferable, on roads with sharp turnings. On such roads the continuous line is actually dangerous, as the turn is completely concealed until the last moment by the converging lines of trunks which, as a general rule, are much alike.

Much more use should be made of hedges, and where possible old hedges should be preserved. The remnants of an old thorn hedge, possibly smothered with "Old Man's Beard," is far more picturesque and suited to our English landscape than all the exotics in the world.

Pleasant features can be made of embankments and cuttings, but in planting the latter, soil must be introduced, as the subsoil exposed is generally unfitted for plant growth, except that of an inferior kind. Occasionally one finds small "islands" where the road has been diverted, and these offer much scope to the planter. It is obviously unnecessary to plant rows of poplars along the road which skirts such places, and yet it has been done.

Cases frequently arise where a scheme of decoration can be broken off for considerable distances in passing some arresting point or landmark. Arising out of this fact we may evolve a fourth type, which might be termed the sporadic system, something between the broken and unbalanced types. It depends for its effect to a far greater extent on the surrounding country, trees and shrubs being only occasionally planted to divert or attract attention. It is astonishing how much of a road can be dominated by an old castle, a range of hills, or a clump of trees in the distance. Closer in, orchards, or even a famous nursery garden, should be sufficient inducement to let well alone, whilst on unenclosed straight roads running through sandy eastern districts an occasional cluster of Scots pine, set so that the traveller gets the full effect of the combination of red bole and sun, will adequately decorate many miles.

The third system is the parkway, only possible where very wide verges are available: certainly not less than 50 feet. A good example is the road from Bix Hill to Henley. This combination of wide grass verges and tall boundary trees, apparently converging on the spire of Henley Church, is probably one of the finest examples of this type in the country. This parkway effect can and should be maintained where the road passes through wooded country or great estates, but otherwise cannot be practised owing to the considerable extra expense involved in the extensive purchase of land which has no actual road value.

At the present time systematic road decoration is, in this country, practically in its infancy, and the best method of dealing with it has yet to be evolved. The Roads Improvement Act, 1925, gives power to County Councils to plant trees and shrubs, lay out grass verges, etc. These are therefore indicated as the competent authority on whom all responsibility for the work will devolve. County Councils have no department which is specially concerned with this matter of road decoration. It is not gardening, nor is it agriculture, and still less is it civil engineering. This fact has been realized, and the present position is much as follows. Under the aegis of the Ministry of Transport a society has been formed called the Roads Beautifying Association. On its Council and on its technical sub-committee are to be found eminent horticulturists and arboriculturists, and leading experts in the motor world, who are prepared to advise and help local authorities in the laying out of their roadsides to the best advantage. At present activities are confined to the vicinity of London, but it is hoped to start local committees in the provinces later on for the same purpose.

An important function of this Association is the raising of money from voluntary contributions for the furthering of its work. Such money as it uses internally is purely for administrative purposes. Its work may now be seen on the Kingston by-pass and in other places.

Its methods may meet with criticism, but it must be remembered that it is largely experimental. This Association provides a much needed foundation for the practice of road decoration, but is it going to be sufficient in the future? It is a voluntary body with no legal standing, and depends for its own existence on the goodwill and enthusiasm of others, and for the success or otherwise of its work on the goodwill and enthusiasm of the Local Authority which it may happen to be assisting.

This Association gives initial advice, and if required it will also help, as far as possible, in the raising of such necessary funds as have not already been provided by the Local Authority or the Ministry of Transport. There is, however, a cloud on the horizon—maintenance. It requires considerable skill to get out a planting scheme; it requires skill to establish the trees and shrubs. It requires just as much skill, and causes a great deal more anxiety, to keep the material growing. More than one well-thought-out and properly launched planting scheme has fallen by the wayside in recent years because this fact has been overlooked. It cannot be the work of the County Surveyor, an engineer pure and simple, or the County Horticulturist, if he exists. His work is almost entirely economic, and connected with gardens and orchards. Who, then, is to be responsible? It is the work of a specialist, with some knowledge of road work, of entomology, plant disease, tree surgery, and manuring.

In the United States, whence we can learn much regarding road planting, the consensus of opinion gained by sad experience goes to show that voluntary supervision is not satisfactory, especially if it is collective—a case, in fact, of too many cooks. Their system, as now adopted fairly generally, is an unpaid committee taken from the Highways Committee, which controls a paid official who is alone responsible for the work. In this country the mileage of road in a county would hardly be sufficient to warrant such an official. An alternative suggestion might be for the Ministry of Transport, which supplies considerable sums towards the making of these roads, to divide the country into large districts and arrange to supply competent advice for the upkeep of natural growth on the roads, in co-operation with an unpaid Commission formed from the County Councils affected, the actual labour being supplied by the local County Horticultural Departments.

At the present time it is possible to see a number of mistakes due either to lack of knowledge or to carelessness. One finds an unsuitable species planted in quantity on an unsuitable soil, and consequently dying wholesale. Trees tied tightly to crooked stakes : in one particular case two stakes 18 inches apart, with the tree attached to a single slack line between them. As regards the various sizes of trees utilized, the most striking case met with was beech, 3 feet in height, in wire netting rings. Its present condition must be seen to be believed.

And now as to choice of species—an important point on which there is a good deal of difference of opinion. There is the school which considers that planting should be confined to our native species, especially to forest trees. There is another which prefers the smaller flowering types, which again are considered by some to be out of keeping with the English countryside. We have also the advocates of the conifer and of the ordinary fruit tree.

Before planting any particular species it is as well to consider one or two general points. A tree planted on the roadside is out of its natural element, and is exposed to dangers which are practically non-existent in its natural habitat. There is considerable exposure to extremes of heat and cold. Damage by fumes and smoke must be taken into consideration where roads pass through industrial areas ; snowbreak and wind damage are also possibilities. The soil is frequently none too good, and is not improved by the wash off badly tarred roads. Even on the best type of road foliage may be affected by fine dust saturated with bitumen. The activities of the Post Office and the public authorities have also to be reckoned with. Much damage is done by the laying of pipes and cables in the vicinity of tree roots. Roots are torn and damaged, and in some cases cut away, and cases may be found where the trunk is bruised and cut by stones and earth thrown up by the excavations. If money is to be spent on tree planting, the planting authority will have to come to a definite understanding with bodies who wish to open up the side-walks and verges on arterial roads. The importance attached on the Continent to such disturbances is shown by the following free translation from regulations for pipe-laying in a district of Brandenburg, Prussia :—

> "At least four feet of firm soil to be left between trench and tree.
>
> "Where there are numerous or strong roots the trench must be interrupted, and the ground left undisturbed for a length of four to six feet. Pipes must be laid by tunnelling.
>
> "Due precaution must be taken against damage to trunks by excavated soil.
>
> "Cut roots to be trimmed square and tarred.
>
> "Contractor to be liable not only for general damage and consequent replacements, but also for a fine for each tree damaged.
>
> "Branch pipe-lines may only be laid midway between trees."

One can see, therefore, how much the German values his trees.

In choosing a species the two most important points to consider are its powers of endurance and recuperation. Cleanliness of habit is also important on public roads, and will rule out certain poplars which shed large quantities of catkins, flowers, or twigs. The length of leaf period is important where trees are planted for shade. Ornamental value must be judged with reference to the situation, and trees of unusual habit, such as fastigiate, dwarf, or pyramidal types, should be used sparingly, and never in mass. Very large trees should be avoided if there is a possibility of topping in the future. It will be found that the normal forest habit will change, and trees will tend to short thick trunks and big heads. Also it will be as well to remember that quick growth means short life.

Whilst the single leader type of tree is really the strongest, too much emphasis should not be laid on this point, as it tends to a similarity of growth which is undesirable in many cases.

If we wish to blend road decoration into the landscape as far as we can, the choice, as has already been stated, is limited to indigenous trees, naturalized trees, and exotics which resemble them to a certain extent. The tulip tree presents itself as an example of the last-mentioned class, also *Sophora japonica*, if the early falling of the flowers is not objected to. *Catalpa bignonioides* could be used in fairly warm sheltered localities.

Much more could be done with species of oak such as *Quercus palustris*, *Q. coccinea*, and *Q. Cerris*. Our native oak is difficult to raise as a highway tree, but where it succeeds the result is worth the trouble. Perhaps one of the best examples of this type in the country is the oak-lined road running along the south side of Bucklebury Common near Newbury.

The sterile horse-chestnuts are very ornamental, but the leaves are apt to turn brown very early if the weather is hot, and they should be confined to areas with a damp or cool subsoil. Maples should be more largely used. *Robinia Pseudacacia* should be confined to light soils and sheltered positions, as it suffers from windbreak. The variety known as *Bessoniana* is to be preferred on the whole. Copper beech is not desirable, being a garden tree pure and simple, and the common beech becomes a short-stemmed heavily branched tree, which is not particularly attractive.

Many of the smaller trees might be used effectively, such as those of the Pyrus family, the purple hazel, and several thorns. The Prunus family have much to recommend them, and should be very useful, once they have grown to a reasonable size. In informal plantings, *P. spinosa* could be an occasional and very attractive feature.

The common elm, once the finest ornament of many country roads, is not particularly desirable. In the southern counties it suffers very much from bark beetle, and we now have the elm disease from Holland to contend with. Moreover, there is the tendency to drop its boughs in calm weather, and to be blown over by gales. If elms are to be used we should choose trees of a fastigiate type, or those trained in early life to a single definite spire.

Most poplars are unsatisfactory. They are short-lived, drop twigs and catkins on to the road, and, unless well sheltered, will lean or curve away from the prevailing winds. The Lombardy poplar is the one chiefly used, but is much overdone. A good substitute would be *Populus Bolleana*. *P. alba*, which is frequently nothing more than a very large shrub, is one of the best to use for natural grouping, or for bank or cutting work.

Amongst shrubs we have Cotoneasters, Berberis, broom, gorse, and Rhododendrons and many others which will prove satisfactory, but a good deal of experiment is necessary in this direction.

Most conifers should be avoided as a rule. The ordinary forest types do not grow well except in mass, and their beauty depends very much on distance. The darker-coloured pines can, however, be worked in on coast roads to advantage. Other species, such as Cedar and Sequoia, are far too formal for rural work. Moreover, the necessary pruning of their lower branches would do away with much of their beauty.

I cannot see very much future for the fruit tree as a road ornament in this country. If any crop formed it would probably be stolen, with very much damage to the tree during the process, a fact of much greater importance than the actual loss of the fruit itself. It is difficult enough to obtain fruit in the orchard or garden, without seeking trouble by planting trees in places where conditions are bound to be adverse at all times.

I do not think there is any place for flower planting in road decoration. Apart from the difficulty of tending the plants they will all be liable to theft, or damaged so as to be quite useless for decorative purposes. Moreover, I have been in no country, and have heard of no country, where this type of decoration is to be found on country roads.

With regard to damage, the culprits may be divided into four classes :—

1. The thief who steals to sell—fairly common.
2. People who do damage for the mere joy of it—unfortunately quite a large number.
3. Children who know no better—very many.
4. People, otherwise perfectly honest, who are attracted by the colours, and do not regard it as theft—an enormous class, of all ages and of every social scale.

I am largely responsible for the upkeep of the natural growth of one of England's most famous open spaces. There I have seen the primroses, ferns, and bluebells gradually disappear ; Guelder roses broken down, young trees pulled up and taken away, and beech foliage torn and stripped to pieces. There are guards on the Rhododendrons and Azaleas every holiday and Sunday whilst they are flowering. What would be the state of the place if it were not policed ? This is not an isolated case, as any estate owner in the home counties where bluebells grow will tell you. When the authorities at Kew and Hyde Park pull down their walls and dismiss their keepers, then one may consider planting flowers, and bright flowering shrubs, but not before.

Trees are a different matter, as in time their flowers and foliage grow out of reach ; but for shrub and hedge work I am certain that we shall have to confine ourselves to those without striking flowers, or those armed with spines, such as *Berberis stenophylla* and the smaller thorns.

The erection of notices requesting people not to pick flowers seems quite useless. People who are influenced by such notices are the type who would not pick them any way. There is only one type of notice which is of any use, and it states that on a certain date at a certain place a certain person was fined a certain sum for damaging or stealing certain flowers or shrubs. The only other notice which I know of which appears to have any effect is to be found on the Hall Barn estate at Beaconsfield ; it runs : " Please do not steal the Rhododendrons."

In this connexion I would urge the great necessity of educating the young as regards respect for the property of the community. In Germany and Austria this has been well implanted, but in this country much spadework has yet to be done.

In the United States and on the Continent, road decoration is considered a really important factor in highway engineering, and this should be the case in Great Britain. It cannot, however, hope to attain this prominence until the idea, held by so many, that it is merely an interesting but minor sideline is completely abandoned.

In conclusion, may I quote to you a passage from the recently issued pamphlet by Professor G. M. TREVELYAN, written by him on behalf of the National Trust. I cannot help thinking that unless road decoration is taken more seriously in this country these words of his will be applicable to many places where new roads are being made.

" 'To what account will our descendants hold us if we bequeath to them an England irrecoverably defaced, mean and mechanical of aspect in every corner? Where, men will say, was this England that we read of in the old poets from Chaucer to Rupert Brooke, that we see depicted by the old landscape painters, the England which men crossed the ocean to visit on account of its delicate beauty, the England to save which the young men went to die in the Great War?' 'Oh,' will be the reply, 'those who survived the war destroyed it, in the ordinary course of business and public improvement.' "

THE AWARD OF GARDEN MERIT.—XIV.*

By F. J. Chittenden, F.L.S., V.M.H.

108. Kerria japonica.

Award of Garden Merit, June 7, 1928.

It is a common and a pleasant sight to see climbing over the porch of many an old Essex or Hertfordshire cottage in March and April the Jew's Mallow in full bloom. Its yellow buttons—an inch and a half across, made up of a mass of bright petals—stud the straggling green-barked growths. Each is borne at the end of a short lateral branch, the branches set closely along the shoots, and bearing at the same time bright green jagged-toothed leaves. This double form was introduced about 1700 from Japan, and was for long the only form known. It must have been difficult to ascertain its relationships in this state, and so we find Thunberg in 1784 in his *Flora Japonica* calling it *Corchorus japonicus*, a name which is still used for it in some gardens and some catalogues, doubtless because it was retained in the *Bot. Mag.*, where the double form was figured at t. 1296, and in the *Bot. Rep.*, t. 587. Linnaeus had been much nearer when he named a dried specimen with single flowers, received from Smith about 1767, *Rubus japonicus*. De Candolle, however, recognized its distinctness from Rubus (for it has no " berry "), and called it *Kerria japonica* after the Kew gardener-collector, William Ker. Under this name the single form was figured in *Bot. Reg.*, t. 1873, not long after its introduction to our gardens, for more than a hundred and thirty years had passed before the single form was seen in flower in Europe in our Garden at Chiswick in 1835, where it was sent by John Reeves, Esq., when it was in full flower. Another excellent plate is given in Sweet's *Flower Garden*, t. 337.

This single form is better worth growing than the double. When first the double form was introduced the stove was deemed its proper place, then the greenhouse, last the wall. The single form is hardier still; it is safe outdoors in any ordinary soil and situation. It grows to 5 or 6 feet in height, making a close tuft of shoots (for many suckers grow round the original planting), and its green stems in winter, its bright cheerful foliage from spring to autumn, and its wide open flowers of cheerful yellow produced over a long season (though mainly in April and May) combine to form an excellent shrub.

---

* For earlier annotated lists see vol. **47**, p. 189; **48**, pp. 58 and 223; **49**, p. 233; **50**, pp. 100 and 260; **51**, pp. 84 and 337; **52**, pp. 82 and 254; **53**, pp. 110 and 325; **54**, p. 218. [The notes on the first hundred Awards are now collected in pamphlet form and may be obtained from the R.H.S. Office, Vincent Square, Westminster, S.W. 1.]

There is also a yellow variegated variety with usually paler flowers growing less vigorously than the type, and to those who like variegated plants by no means unpleasing.

109. ASTER THOMSONII.

Award of Garden Merit, October 3, 1927.

There are few among herbaceous perennials having a longer flowering period than *Aster Thomsonii*, a native of the Himalaya, whence it was introduced into English gardens a good many years ago. Strangely enough, it is not very frequently seen, and is not even mentioned in some of the larger books on herbaceous plants. Yet it is an indispensable plant for the border, thriving in ordinary soil, with stiff stems about 2 feet in height needing no stakes, and broad, pointed, coarsely toothed leaves of a dull greyish colour. The flowers begin to open in July; the rays are pale blue and the span about 2 inches. Each is solitary on a stiff long stalk, long-lasting, and the succession continues into October. There is a dwarfer form, called *nanus*, equally desirable, about 18 inches in height. It is best transplanted in spring, like *Aster Amellus*, and should be raised from seeds or from cuttings, for it does not take at all kindly to division. Cuttings of the young growths taken in spring may be rooted in the frame. The species itself does not vary much, but recently M. FRIKART has crossed it with *Aster Amellus* and produced a race of plants rather more floriferous, and with rather larger flowers of equally good form, called *Aster* × *Frikartii*, the best known being the variety 'Stäfa.' When it is more widely known it is probable that this race will be equally popular with *A. Amellus*, and indeed it and its parents form a trio which may well find a place in every sunny, well-drained hardy plant border, no matter how small.

110. ASTILBE SIMPLICIFOLIA.

Award of Garden Merit, August 8, 1927.

The late Mr. REGINALD FARRER, in his *English Rock Garden*, tells how one day in an imported mass of Schizocodon there turned up "unbeknowst" a plant which ere long revealed itself as the most lovely little Astilbe imaginable. It was *Astilbe simplicifolia*. We do not know whether this was the first or only introduction of the plant into England, and it is still described in some catalogues as "new and rare" (although it is not high-priced), but it is now grown and valued by many who appreciate a plant of delicate loveliness; and all those who have a moist and shady nook in the rock garden might plant it with advantage. Its association with *Schizocodon soldanelloides*, one of the most troublesome of Japanese woodland plants to accommodate, might lead one to suppose it rather difficult too, but it is not, and its tuft of deep-lobed, toothed leaves is a pleasant sight to see, and more pleasant still the feathery spire of tiny white flowers, 6 or 8 inches high, which it produces in due course. It comes from seed, and varies in colour to rose and has given some very charming hybrids.

111. SPIRAEA VENUSTA.

Award of Garden Merit, August 8, 1927.

The herbaceous Spiraeas are generally plants of moist pastures or the water side, but almost all will grow well in the ordinary well-cultivated border. *Spiraea venusta* of gardens probably originated in the prairies of North America, and is thus naturally a sun-loving plant, but it is so accommodating as to flourish almost equally in the open sunny border (provided the soil is not too dry), in partial shade, and on the edge of the pond or bog. There is, as in so many instances, some confusion over the name of this plant, and we are using the name *Spiraea venusta* here in the sense in which it is used in garden catalogues, for the plant with pink, almost peach-blossom coloured flowers, with leaves giving off a scent when bruised and divided into seven or nine leaflets, the terminal one being very large, and with its tiny flowers in a large branching cluster recalling that of an Astilbe, on smooth stalks up to 3 or 5 feet in height, in July and August. In some books, e.g. NICHOLSON'S *Dictionary of Gardening*, ROBINSON'S *English Flower Garden*, we must seek this plant under *S. lobata*, but that name is now used in catalogues for a dwarfer plant with more finely cut foliage and rose-pink flowers—a plant indeed fitter for the rock garden than the border. There is a taller variety of *S. venusta* called *magnifica*, with flowers larger and deeper in colour than the type, and another var. *albicans*, with light pink flowers described and pictured by M. M. BARBIER in *Rev. de l'Hort. Belge*, 3 (1877), p. 169, a variety which appeared in the nursery of M. SIMON LOUIS at Metz.

The plant is regarded in America as a variety of *S. lobata* now called *Filipendula rubra* (and sometimes *F. lobata* and *Ulmaria rubra*), while it has for a synonym *Spiraea palmata* of Linnaeus (not of gardens). The fine figure and description in JACQUIN'S *Hortus Vindobiensis*, vol. 1, p. 38, leaves no doubt that he gave this plant the name *Spiraea lobata* which he received from his friend GRONOVIUS and grew in 1769.

112. HYPERICUM REPTANS.

Award of Garden Merit, July 4, 1927.

Prostrate, vigorous, close growing, bright green mats ornamented with large yellow flowers and almost crimson buds from August until frost, together with an accommodating temperament, make the Sikkim *Hypericum reptans* a very valuable occupant of suitable places fairly high up on the rock garden, where so long as the situation is not too bleak and windy and damp-cold it will prove hardy. Even in spring and winter it is not without distinction, for its foliage is then red or yellow here and there. Ordinary good soil serves it, and a sunny rock to lie upon. It may be raised from cuttings or from seed, both of which it produces readily enough.

113. RIBES SANGUINEUM SPLENDENS.

Award of Garden Merit, April 4, 1928.

The 'flowering Currant' is too well known to need much comment. Its claim to a place in the garden is assured, and no soil unless it be a very poor dry sandy one, robbed by the roots of other trees, comes amiss to it. The superior colour and larger size of the flowers of the variety *splendens* has led to its selection for the Award, and with this advantage in its favour it has no countervailing drawback. It flowers with the same freedom as the common type introduced by DOUGLAS in 1826 from Western North America, when collecting for our Society, at the same welcome time in April, forms the same shapely bush, eventually growing to 6 feet in height and more through, and bears without resentment the pruning necessary to fit it for more restricted space. The original name as given by Mr. THOMAS SMITH of Newry is here retained for this variety. Like all the forms of this species it is readily propagated by cuttings.

114. VIOLA 'JERSEY GEM.'

Award of Garden Merit, January 14, 1929.

Viola 'Jersey Gem' is a very floriferous tufted Viola with dark violet-blue flowers, rather small compared with some varieties, but none the less pleasing on that account. The petals are waved and it thus lacks something in regularity of shape, but the flowers stand erect on stiff stalks and are produced over a very long season. It withstands cold winter weather well, and often begins to flower in April. Like other Violas of its habit, it is easily raised from cuttings of the unflowered shoots, or by division, and also like most other Violas it does not come quite true from seed, varying in colour though not much in habit and shape of flower.

Mr. CUTHBERTSON tells me it was raised by Mr. T. A. WESTON a few years ago at his home in New Jersey, U.S.A. (whence its name). The seed came from Britain, but nothing is known of its parentage.

PHLOX DRUMMONDII AT WISLEY, 1928.

THE seed of these plants was sown under glass on March 17, and the resulting plants, 28 of each stock, planted out on June 4, the plants being 1 foot apart in rows 18 inches asunder. Flowering commenced on July 16, and the plants were constantly in bloom from that date until the beginning of November. Few annuals (or plants grown as annuals) have so long a flowering period. After several inspections the trial was judged on August 15, and awards recommended as shown below.

It will be seen that there is considerable difference in the heights attained by the plants, the dwarf forms being only 6 to 8 inches in height, the normal reaching 12 to 15 inches. The flowers vary in size and shape—normal, grandiflora, and the curious cuspidate type with toothed petals being distinguishable.

Several stocks (8 in all) failed to germinate, and they are not further referred to. Many stocks contained a larger number of rogues than the Judging Committee considered permissible. It is not easy to breed *Phlox Drummondii* exactly true to shade in all colours, but there were more actual colour rogues than seemed necessary; there were stocks mixed as to height, and others mixed as to type of flower. While there is no reason to confine one's planting to varieties true to a particular colour, the Council considers that if a variety is sent to the trials as having distinct characteristics, and with a distinctive name, the stock should be true to those characters.

AWARDS, DESCRIPTIONS, AND NOTES.

Flowers white.

AWARDS.

grandiflora alba, A.M. August 15, 1928. Sent by Messrs. Dobbie of Edinburgh and Messrs. Barr of King St., Covent Garden, W.C. Also as **Giant White** by Messrs. Burpee of Philadelphia, U.S.A.; this shares the award.

nana compacta White	**H.C.** August 15, 1928.	Sent by Messrs. Watkins & Simpson of Drury Lane, Covent Garden, W.C.
nana compacta Snowball		Sent by Messrs. Barr.

NANA COMPACTA WHITE (Watkins & Simpson), **H.C.**—6 inches; habit compact; flowers ⅝ inch diameter; white.

NANA COMPACTA SNOWBALL (Barr), **H.C.**—Like 'nana compacta White.'

PURE WHITE (Heinemann).—6 to 7 inches; habit compact; flowers ⅞ inch diameter; white. A good strain, but stock not quite fixed, needs further selection.

* * *

GRANDIFLORA ALBA (Dobbie, Barr) GIANT WHITE (Burpee)	**A.M.**—12 to 15 inches; habit spreading; flowers 1 inch diameter; white.

GRANDIFLORA ALBA (Benary).—Like the last, but contained crimson and cream rogues.

GRANDIFLORA WHITE (Morris)—Like 'grandiflora alba,' but contained a crimson rogue.

Flowers creamy-buff.

APRICOT (R. Veitch).—6 inches; flowers $\frac{7}{10}$ inch diameter; pale creamy-buff, eye buff.

* * *

GRANDIFLORA ISABELLINA (Benary, Barr, Dobbie).—12 to 15 inches; habit spreading; flowers 1 inch diameter; creamy-buff. Stocks contained carmine to crimson rogues.

PRIMROSE (Burpee).—Like 'grandiflora isabellina.' Contained carmine and blue rogues.

Flowers pink.

APRICOT (Heinemann).—6 to 8 inches; habit compact; flowers 1 inch diameter; pale creamy-pink, eye greenish-white. Colour variable, stock not fixed.

NANA COMPACTA DELICATA (Morris).—6 to 8 inches; habit compact; flowers $\frac{3}{4}$ inch diameter; pink with rose centre. A mixed stock, germination poor.

Flowers pale salmon-pink.

SALMON QUEEN (Dobbie).—12 to 15 inches; habit spreading; flowers 1 inch diameter; pale salmon-pink, centre star-shaped rose.

GRANDIFLORA CHAMOIS ROSE (Benary, Barr).—Like 'Salmon Queen.' Stocks variable in shade.

PINK (W. H. Simpson).—Like 'Salmon Queen.' Variable in shade.

GRANDIFLORA CARNEA (Barr).—Like 'Salmon Queen.' Variable in shade.

ROSE (R. Veitch).—Near 'Salmon Queen,' but flowers a shade darker with a deep salmon centre. Stock variable.

Flowers rosy-salmon to salmon.

NANA COMPACTA ROSE CARDINAL (Watkins & Simpson).—8 inches; habit compact; flowers $\frac{9}{10}$ inch diameter; bright rosy-salmon, eye darker. Variable in shade.

DARK CHAMOIS (Heinemann).—6 inches; habit compact; flowers $\frac{7}{8}$ inch diameter; rosy-salmon, eye rose. Contained pink and magenta rogues; variable in shade.

GRANDIFLORA CHAMOIS ROSE (Morris).—Like 'Dark Chamois.' Crimson rogues and varied in shade, not 'grandiflora' but normal type.

NANA COMPACTA CHAMOIS ROSE (Watkins & Simpson).—6 to 8 inches; habit compact; flowers $\frac{7}{8}$ inch diameter; bright rich rosy-salmon, eye rose. Very variable in shade.

ROSE (W. H. Simpson).—8 inches; habit compact; flowers $\frac{9}{10}$ inch diameter; rich salmon.

Flowers rose.

GRANDIFLORA BRILLIANT (Barr).—12 to 15 inches; habit spreading; flowers 1 to $1\frac{1}{10}$ inch diameter; pale rose, centre deep rosy-crimson.

ROSE, WHITE CENTRE (Morris).—12 to 15 inches; habit spreading; flowers 1 to $1\frac{1}{4}$ inch diameter; rose, zoned white around crimson eye.

GRANDIFLORA LEOPOLDI (Barr).—Like 'Rose, White Centre.'

GRANDIFLORA ORBICULARIS ATRO-ROSEA (Barr).—12 to 15 inches; habit spreading; flowers 1 inch diameter; rich rose, centre pale creamy-white.

ROSE STAR (Burpee).—Like last.

Flowers rosy-red.

AWARD.

grandiflora oculata, A.M. August 15, 1928. Sent by Messrs. Barr.

NANA COMPACTA CARMINEA (Morris).—6 to 8 inches; habit compact; flowers $\frac{9}{10}$ inch diameter; bright rosy-red, centre white. Rose, white and tall rogues.

* * *

GRANDIFLORA OCULATA (Barr), A.M.—12 inches; habit spreading; flowers 1 inch diameter; bright rosy-scarlet, band of white around eye.

CRIMSON, WHITE EYE (Dobbie).—Like 'grandiflora oculata' but variable in shade.

Flowers scarlet.

AWARDS.

nana compacta Fireball, H.C. August 15, 1928. Sent by Messrs. Watkins & Simpson and Messrs. W. H. Simpson of Monument Road, Birmingham.

grandiflora stellata splendens, H.C. August 15, 1928. Sent by Messrs. Barr.

grandiflora coccinea	H.C. August 15, 1928.	Sent by Messrs. Barr, Benary of Erfurt, Germany, R. Veitch of Exeter.
grandiflora Scarlet		Sent by Messrs. Morris of Bristol St., Birmingham.
Red Prince		Sent by Messrs. Barr.

NANA COMPACTA CINNABARINA (Watkins & Simpson).—6 inches; habit compact; flowers ⅘ inch diameter; bright scarlet, eye deep scarlet. Crimson and rose rogues.

NANA COMPACTA FIREBALL (Watkins & Simpson, W. H. Simpson), **H.C.**—6 inches; habit compact; flowers ⅘ inch diameter; rich scarlet-crimson, eye maroon. Stocks not quite true.

CRIMSON GEM (Barr).
FIERY RED (Heinemann). } Like 'nana compacta Fireball.' Variable in shade.

* * *

VERMILION (Sluis & Groot).—12 inches; habit spreading; flowers ⅞ inch diameter; pale fiery-scarlet, eye crimson.

SCARLET (Burpee).—12 to 15 inches; habit spreading; flowers $\frac{9}{10}$ inch diameter, scarlet, eye crimson.

SPLENDENS (Dobbie).—12 to 15 inches; habit spreading; flowers $\frac{9}{10}$ inch diameter; scarlet, zoned white, eye maroon. Violet and magenta rogues.

CRIMSON BEAUTY (Barr).—12 to 15 inches; habit spreading; flowers 1 inch diameter; deep scarlet, zoned white, eye magenta.

CRIMSON WHITE EYE (Morris).—Like 'Crimson Beauty.'

GRANDIFLORA STELLATA SPLENDENS (Barr), **H.C.**—12 to 15 inches, habit spreading; flowers 1 inch diameter; deep scarlet, eye and band white.

GRANDIFLORA COCCINEA (Barr, Benary, R. Veitch), **H.C.**—12 to 15 inches; habit spreading; flowers 1 inch diameter; crimson-scarlet, star-shaped maroon centre.

GRANDIFLORA SCARLET (Morris)
RED PRINCE (Barr) } **H.C.**—Like 'grandiflora coccinea.'

Flowers maroon.

GRANDIFLORA PURPLE (Barr).—12 to 15 inches; habit spreading; flowers 1 inch diameter; crimson-maroon, centre maroon. Variable in shade.

GRANDIFLORA ATROPURPUREA (Benary).—A darker and duller selection of 'grandiflora Purple.'

GRANDIFLORA DEEP BLOOD RED (Morris).—Like 'grandiflora atropurpurea.'

Flowers lilac.

LIGHT BLUE WHITE CENTRE (Heinemann).—6 to 8 inches; habit compact; flowers 1 inch diameter; lilac, band and eye white. Very variable in colour.

* * *

GRANDIFLORA LILAC (Barr, Burpee).—12 to 15 inches; habit spreading; flowers 1 inch diameter; lilac-mauve, band and eye white. Variable in shade.

Flowers magenta.

CRIMSON, CENTRE WHITE (Heinemann).—6 to 7 inches; habit compact; flowers 1 inch diameter; magenta, band and eye white. Stock mixed.

* * *

GRANDIFLORA ROSEA (Morris).—12 inches; habit spreading; flowers 1 inch diameter; bright rosy-magenta, eye crimson.

VIOLET (Burpee).—12 to 15 inches; habit spreading; flowers 1 inch diameter; magenta, band white, eye violet. Contained scarlet rogues.

GRANDIFLORA ORBICULARIS VIOLACEA (Barr).—12 to 15 inches; habit spreading; flowers 1 inch diameter; deep violet-magenta, centre creamy white. Mixed with pink and crimson rogues.

Flowers violet.

Dark Blue (Heinemann).—6 inches; habit compact; flowers 1 inch diameter; pale violet, centre creamy-white. Tall crimson rogue.

* * *

Violet (Sluis & Groot).—12 to 15 inches; habit spreading; flowers $\frac{7}{10}$ inch diameter; violet-blue, centre violet-maroon.

grandiflora striata coerulea (Benary).—12 to 15 inches; habit spreading; flowers 1 inch diameter; violet streaked with white. Contained white, maroon and crimson rogues

Flowers of mixed colours.

Awards.

Paragon Dwarf Mixed, H.C. August 15, 1928. Sent by Messrs. Webb of Wordsley, Stourbridge.

Drummondii Mixed, H.C. August 15, 1928. Sent by Messrs. Spruijt of Utrecht, Holland.

Paragon Dwarf Mixed (Webb), **H.C.**—6 to 8 inches; habit compact; flowers $\frac{3}{4}$ to 1 inch diameter; colours mixed. Of 'nana compacta' type.

nana compacta Mixed (Rivoire).—Of 'nana compacta' type.

Drummondii Hortensiaeflora (Morris).—Of 'nana compacta' type.

* * *

Drummondii Mixed (Spruijt), **H.C.**—12 to 15 inches; habit spreading; flowers 1 inch diameter; colours mixed. Of 'grandiflora' type.

Mixed (W. H. Simpson).—Of 'grandiflora' type.

grandiflora Mixed (Rivoire).—Of 'grandiflora' type.

Elegant Mixed (Webb).—Of 'grandiflora' type.

* * *

Cuspidata (Barr).—12 to 15 inches; habit spreading; flowers $\frac{3}{4}$ inch diameter, deeply fimbriated; of mixed colours. Sent as 'Hortensiaeflora splendens' in error.

Fringed Mixed (Webb).—Like 'Cuspidata.'

BOOK REVIEWS.

"A History of Garden Art." By Marie Louise Gothein. Ed. by W. P. Wright. Trans. by Mrs. Laura Archer-Hind, M.A. 8vo. 2 vols. 459 + 486 pp. (Dent, London, 1928.) 84*s*. net.

"The Hardy Heaths and some of their Nearer Allies." By A. T. Johnson. 8vo. 116 pp. (Gardeners' Chronicle, London, 1928.) 3*s*. 6*d*.

We regret that in the reviews of these two books published in our last issue (see pp. 237–240) one or two statements apt to mislead appeared. The paragraph dealing with English gardening in the former suggests that insufficient care was taken to select for description and illustration gardens typical of English taste at the present time. As a matter of fact a large number of well-known English gardens are mentioned and many are illustrated in this chapter. The nature of the illustrations and the method of reproduction put hand-made paper out of court for the book, and as the review states their treatment generally has given a book of great beauty and distinction.

In the second review it is not clear that the author went out of his way to protest against the practice of clipping heaths after flowering, and that he records his conviction that it is an evil practice where the beauty of heaths is to be maintained.

"The Lilac: a Monograph." By Susan Dekano McKelvey. 4to. 581 pp. 172 half-tone plates and four colour charts. (Macmillan natural Company, New York, 1928.) £3 15*s*. net.

Mrs. McKelvey and those who assisted her in the production of this magnificent work must be congratulated on its wealth of detail and completeness, which should earn the gratitude of all botanists and horticulturists. In the Preface we learn that the late Professor Charles Sprague Sargent—to whom this work is dedicated—was some years ago the instigator of this monograph of one of his favourite shrubs. We learn also that Mrs. McKelvey has visited most of the leading horticultural establishments, botanic gardens, herbaria, etc., in Europe and America to glean all that could be discovered relating to the history and nomenclature of this genus.

She finds, it is interesting to note, that the Lilac was first mentioned in literature by Pierre Belon in his "Observations," 1554.

A novelty in connexion with this sumptuous monograph is the inclusion within a pocket in the cover of four colour charts by Robert Ridgway, which should enable the reader to visualize the exact shade referred to in the text. The book also contains superb photographic reproductions, not only of Syringas in full leaf and flower, but close-up views of stems in winter and bursting buds in springtime.

Of much value to horticulturists is a Key to the Species, by Alfred Rehder, so fully described that an amateur should be able to identify the species.

Considering that there are scarcely more than twenty-eight species in this genus, and not an excessive number of varieties even of common Lilac, one is struck by the wonderful research and care which has collected information from apparently every available source, both recent and remote, sufficient to fill 581 pages.

Under the heading "History and Distribution," by Mr. E. H. Wilson, it is interesting to be reminded that the Lilac is an old world group of shrubs and low trees confined, with two exceptions, to Asia. These two exceptions are *Syringa vulgaris* and *S. Josikaea*, found in central and south-eastern Europe. Also, that *S. pekinensia* var. *japonica* is abundant in Hokkaido, where trees 45 feet tall are not uncommon, and that *S. persica* is really of Chinese origin and must have been introduced to Persia by trade caravans centuries ago. In this chapter the history of all the species is most attractively written.

Amongst those who have assisted Mrs. McKelvey in the production of this sumptuous monograph, Messrs. Emile Lemoine, Alfred Rehder, C. K. Schneider, C. E. C. Fisher, T. A. Havemeyer, Dr. Councilman, and others are mentioned.

To those who are bewildered by the ever-increasing number of new plants, it is encouraging to note that, although there are eight new species described which are not enumerated in the latest "Kew Hand List," the author assigns several so-called "species," new in gardens, as synonyms of previously described species. For example, *Syringa Wilsoni* Schneid., *S. albo-rosea* Brown, and *S. Adamiana* Balf. f. and W. W. Smith are synonymous with *S. tomentella*. Of the well-known species to have the nomenclature revised is *S. japonica* Decne., now named *S. amurensis* var. *japonica* Maxim.

The writer points out the variability within the species as to the presence, absence, or amount of pubescence on stems, leaves, or inflorescence.

In the long chapter on Forcing, the crude commercial practice (now happily almost discontinued) of colouring Lilac flowers by artificial pigments in solution is shortly reviewed. It is of interest to note in this chapter that the use of anaesthetics for forcing was first experimented by Dr. W. Johanssen of Copenhagen so long ago as 1890, and that M. Emile Lemoine wrote an article for the R.H.S. JOURNAL in 1903 on the use of ether and chloroform for forcing Lilacs.

In a short chapter on Culture, by Theodore A. Havemeyer, the few hints on planting, pruning, and manuring are most useful. But no mention has been found that pruning should be effected immediately after flowering; also, that apart from thinning out the closely placed shoots, the less pruning the better. In the next section, devoted to "Propagation and Pruning," the matter is more fully treated, and propagation by grafting is evidently regarded as a necessity in order to keep pace with the demand for novelties of the common Lilac.

Apparently insufficient emphasis is given to the necessity for vegetative propagation by cuttings, layers, and suckers. Grafted Lilacs are not satisfactory, and buyers should insist on own-root plants.

A chapter on "Diseases and Insect Pests," by Dr. William T. Councilman, completes this remarkable volume on the genus Syringa —a unique monograph which will for many years constitute a monument to the remarkable research and painstaking industry of an American lady-botanist.

"The Unconventional Garden." By Sir Arthur F. Hort. 8vo. 280 pp. (Edward Arnold, London, 1928.) 10*s*. net.

Like as we owe the invaluable English translation of Theophrastus's "Enquiry into Plants" to the meeting of Canon Ellacombe and Sir Arthur Hort, so also this present work should be regarded as another fruit from the same tree. Though there is no evidence of a conscious attempt to wear the mantle of the elder prophet, it soon becomes clear to the reader that the younger writer has the same natural gift of combining in a charmingly framed sentence his personal knowledge of living plants with the plant lore of the classical writers. In the writings of both we seem to step from the well-chosen library to the garden and back again on almost every page.

Try how you like such exercise by reading of Oenothera on p. 140; of Hellebore as the cure for madness on p. 31. Although you may have no need for a trip to Anticyr, p. 87 will convince you that the author is a worker among the plants. The chapter on Pyrenean Plants at Home reminds one of Ellacombe's joyous description of Piora. The chapter on Irises is such as could come from no other living man. Sir Michael Foster's knowledge and rare species were freely handed on to Sir Arthur to be made splendid use of, resulting in the enrichment of gardens with the finest forms of Tall Bearded Irises of the present day. He is, however, too modest to write of the glories of Anne Page, Theseus, Speed, or others of his own raising. The account of rock gardening shows upon what good terms he lives with his Saxifrages. Especially delightful is the charitable plan for beautifying "Wild Corner" which, in its division B, even provides homes for plants which in other quarters might be regarded as undesirables. In spite of an endeavour to harden his heart against some of them, only *Polygonum cuspidatum*, *Campanula rapunculoides*, and *Petasites fragrans* seem to be finally banned, and justly so, if possible. How long will it be before a Campanula arriving under an attractive name reveals itself as an unusually virulent form of the old enemy?

There can be no doubt but that this excellent book will do much to encourage garden lovers to care for plants, not merely as various tints in a colour scheme, but for their individual beauty and history, and at the same time help them to grow many plants successfully by following the valuable cultural hints gathered from the experience of such a skilled gardener and author.

"Pioneers of Plant Study." By Ellison Hawks. 8vo. 288 pp. (Sheldon Press, London, 1928.) 12*s*. 6*d*. net.

This work is a masterly compression into a pleasantly readable form of a vast amount of information. Beginning with the plants of the ancients, those of Egypt, Assyria, China, the Old Testament, and the Phoenicians are dealt with before the work of the Greek pioneers brings us to the men who laid the foundations of our knowledge. Aristotle, the father of Natural History, and his pupil Theophrastus lead us on through Pliny, the Arab physicians, and the herbalists to the Systematists, Caesalpinus, Ray, Tournefort, and Linnaeus.

A surprising wealth of interesting facts connected with the work and discoveries of each botanist rewards the thorough reader; for this is more than a book of reference, it is a well-marshalled selection of the most illuminating fruits of wide reading.

For instance, we learn that Charles Daubeny, experimenting on the action of light on growth, used Magdalen College port as a colour screen; the transitions of Pliny's name for the Clove, Caryophyllon, the plant with a leaf like that of the

Walnut, to Giroflée and our Gilliflower, and the transference of the name of that spice-bearing plant with walnut-like leaves to the family Caryophyllaceae, many of which have grass-like foliage, make interesting reading.

The effect of Mrs. Ewing's story, "Mary's Meadow," on the price and appreciation of Parkinson's Paradisus is mentioned. Good accounts are to be found of the travels of Marco Polo, Sir John Mandeville, Ion Batista, and Columbus; and a separate chapter deals with plant collecting in the tropics. So this excellent "outline" of the growth of plant knowledge, as the author modestly terms it, brings us down to the nineteenth century only, but fortunately we find a hope expressed in the Preface that the near future will bring a companion volume dealing with Pioneers of Plant Culture. May it come soon.

"Beautiful Flowers of Kashmir." Vol. II. By Ethelbert Blatter, S.J., Ph.D., F.L.S. 8vo. 204 pp. (J. Bale, Sons & Danielsson, London, 1928.) 21*s.* net.

Those who possess and enjoy Father Blatter's first volume will warmly welcome this second series. It includes one plain and twenty-nine coloured plates, most of which contain more than five figures, making a very valuable addition to the coloured figures of Eastern plants.

It is pleasing to see the beautiful *Codonopsis ovata* figured at last in something like its exquisite azure colouring, as Wallich's plate is far too deeply coloured. The strange form and brilliant colourings of a dozen species of Pedicularis make us feel that Kashmir is indeed a land of beautiful flowers. Mrs. Wathen's picture of the Crown Imperial which forms the frontispiece is charming in the drawing and graceful posing of its blossoms and bracts, recalling the beautiful representation of the plant in Van Huysum's fine group in the Wallace Collection. As in the former volume the extreme reduction in size of the plants, though necessary for the inclusion of so many, must mean a sad sacrifice of the beauty of both the living flower and the original drawings. A fresh feature in this volume is the explanation of the botanical names. This is well done and greatly adds to the interest. Thus we find "Androsace from the Greek aner, andros a man, and sakos a shield, because the leaves of some species resemble the shield of the ancients"; "Sarmentosa means being provided with stolons or runners"; and so on.

Primulas, Gentians, Boraginaceous and Liliaceous plants and orchids are dealt with, and therefore this volume equals the former in interest.

"The Forestry Question in Great Britain." By Professor E. P. Stebbing. 8vo. 217 pp. (John Lane, London, 1928.) 7*s.* 6*d.* net.

The writer of this book was at one time in the Indian Forest Service and is now Professor of Forestry in the University of Edinburgh. Apart from this book, it is well known that Professor Stebbing has made a study of forestry problems and consequently his contribution to the limited forestry library of this country will be welcomed generally. Moreover, he is a skilled writer, so that his book will appeal to those who seek information in his subject and take pleasure in candid criticism presented in a very readable form.

Professor Stebbing wishes to convey a message. It is not very clear to whom he would wish it to be delivered. It may be that he is chiefly addressing himself to "the public" to enable it to form an opinion upon the forestry question in this country, or possibly he has in mind the erring landowner, or the Forestry Commission. Anyhow, he divides his work into two sections: "The Case for the Public" and "The Case for the Forester," but the book as a whole makes out a very bad case against them both. We, as a nation, so he points out, have erred very grievously; from the days of Nelson we have neglected our woodlands and failed to learn the lessons that our neighbours could have taught us. We have lacked the forester with wide administrative experience and we have created a Forestry Commission which is gifted with enthusiasm and energy and is animated by the highest principles, but, sad to say, neglects the principles of good sylviculture which is the foundation of the whole business.

It is a sad story, but the Professor tells it all very cheerfully and supports it with quotations from the Reports of the Forestry Commission and the census of British Woodlands. He has hopes of the advent of a forest office of wide experience, that the Commission will see the error of its ways and regenerate our woodlands by natural seeding and find ways to plant up the derelict woodlands of private owners and the waste areas subject to Common rights. Lastly, he pins his faith to the well-paid forest officer of "the right sort," who will grow up to be a sportsman and serve to popularise forestry amongst all classes in the future.

"An Introduction to the Study of Plants." By F. E. Fritsch and E. J. Salisbury. (Bell & Sons, 1928.) *7s. 6d.*

This deservedly popular textbook of elementary botany has been brought up to date, this being the third edition. Here the plant is considered as a living organism in its relationship to the environment. The characteristic feature of this book is that it deals with plant communities in a section which proves a delightful introduction to ecology.

The numerous illustrations are good, the photographs of plant communities excellent; moreover, the price is reasonable.

"Charles Darwin: The Man and his Warfare." By Henshaw Ward. (John Murray, 1927.) *21s.*

That Elizabethan philosopher, a contemporary of those illustrious merchant explorers who enriched trade and preserved our freedom, writing "of Travel," says: "Travel in the younger sort is part of education, in the elder, a part of experience, . . ." that "Young men travel under some Tutor, or grave servant I allow well, so that he be such a one that hath the language and hath been in the country before, whereby he may be well able to tell them what things are worthy to be seen in the country where they go."

The travels of the naturalist explorers in the Victorian era not only enriched our knowledge of the variety of animals and plants, but provided the basis for theoretical work which ultimately gained for scientific thought a freedom it had not previously enjoyed.

In this biography interesting descriptions are found of Darwin's travels and voyages in the *Beagle* with that excellent tutor, Lyell's "Principles of Geology," well able to show him worthy things. Bacon did not list rocks, flowers, and animals; nor could he have imagined that any diary should have proved of such value. Other sketches of travel include those of Wallace, who, having lost all his valued collection from South America in a fire at sea, set out for the East Indies; of Huxley's voyages in the *Rattlesnake* near the Great Barrier Reef; of Hooker's journeys in India, where by sheer force of personality he triumphed, despite exceedingly stubborn opposition.

In this galaxy the author brings us to realize the worth of Asa Gray's work in America; we catch a fleeting glimpse of the brilliant, not to say meteoric, Agassiz working in North America.

To-day in certain states recrudescent arguments concerning evolution lend force to the author's sub-title, "The Man and his Warfare," for this American biography is distinguished particularly by the author's viewpoint. Considering the speculations of Goethe we read that: "No divination of poetry or philosophy can anticipate the knowledge that comes from dissecting barnacles and observing fossil armadillos and studying the methods of pigeon breeders, and then unlocking all the dissimilar mysteries with one key," and again the protest against "the distortion of Darwin's work by philosophizing minds."

He quotes (p. 23) Matthew Arnold's reply to Professor Judd when the latter pointed out that Darwin proved what Lucretius guessed; Arnold retorted: "Ah, that only shows how much greater Lucretius really was, for he divined a truth that Darwin spent a life of labour groping for." In this life of Darwin you are to see why science regards Matthew Arnold as an arch-Philistine.

Continual use is made of this sobriquet—in fact, Goliath is mentioned almost *ad nauseam*. But, in regard to the underlying thesis, are we prepared to admit that the slow, sure steps of Science mark the only road to Truth?

Early chapters deal briefly but adequately with the work of Buffon, Lamarck, and Erasmus Darwin, whose comprehensive outlook led him to express his ideas in somewhat extravagant terms. His grandson, although possessing a wider outlook yet accurately observed details, co-ordinated his facts, and marshalled them into such a formidable array. The biography naturally enough does little more than mention the years of Darwin's specialized work—his classic researches on barnacles, earthworms, and the fertilization of orchids. Yet space is found for a few facts concerning the thrushes of James, Charles, and Chatham Islands of the Galapagos group. The importance of island flora and fauna can scarcely be over-estimated. Seventy years after Darwin, a most substantial contribution to the problem of species and distribution has been made by Willis as a result of his studies of island floras in Ceylon, and the Chatham and Kermadec Islands off New Zealand.

The book, like most modern plays, may be divided into three acts—the first dealing with the voyages and travels, the second with the "Origin of Species." The curtain falls dramatically on the rout of the opponents by Huxley and Hooker at the Oxford meeting of the British Association in 1860. The third section is concerned with Darwin's subsequent publications and the later years of his life.

Discussion of controversial topics of a highly technical nature found in the text, as on p. 346 for example, where we read of perpetual variation and the effects of *continuous* selection to produce new races in domestication, would be out of place here ; it may suffice to remind the reader of Bateson's study of discontinuous variation and mutations, of De Vries' mutation theory, of Johanssen's pure line theory and the statistical criticism of this work, besides, of course, Mendel's work. The selective action of the intense struggle for existence has never been seriously challenged, however, but as yet the riddle of variation remains in many ways unsolved.

To Sir Francis Darwin's well-known biography the author is indebted for his description of Darwin's home life ; he dedicates his book to Major Leonard Darwin " as the only way of thanking him for his kindness in helping him."

The book contains an appendix in which much useful data of a biographical nature are contained. There are also some two dozen illustrations. Unfortunately, a few errors in the printing were found.

" Principles of Plant Pathology." By C. E. Owens. 8vo. xii + 629 pp. (John Wiley, New York, 1929.) 23*s.* 6*d.*

Following on a long period when modern works on plant pathology were much desired but were not forthcoming, the present time is remarkable for the number of textbooks which have appeared. This, the latest work from the United States, is intended primarily for undergraduates in American schools of agriculture.

Part I., consisting of 13 chapters (pp. 1–149), starts with a brief historical account of the development of the science of plant pathology, especially in America, and goes on to deal with general problems, such as the relation of plant diseases to environment, sick soil conditions, storage and marketing problems, and control measures. Part II. describes in detail certain selected diseases, their causes, symptoms, and control. The diseases are classified according to cause, namely, those caused by Mycetozoa, Bacteria and Fungi, Algae, parasitic flowering plants, nematodes, viruses, and non-parasitic diseases. In accordance with the aim of the book the diseases selected are those which occur commonly in America, but it is unfortunate, even for the American student, that the literature references quoted are equally one-sided, and include very few to papers or periodicals other than American.

Directions for laboratory work are added, with the somewhat naïve remark that they are intended " for the benefit of those teachers who have not the time or do not care to make their own laboratory outlines." Each chapter closes with a list of " review questions," presumably intended for the same type of teacher.

Both descriptions and illustrations are good, and no doubt the book will serve admirably those for whom it is intended.

"Plant Diseases." By F. T. Brooks. (University Press, Oxford, 1929.) 21*s.*

This book deals with diseases of British crops, and to some extent with those occurring in the Empire and in other countries of the world. With the exception of Bennett's " Fungi and Plant Diseases " we have not had a British book on this subject since the last edition of " Massee," and Mr. Brooks's experience in the training of plant pathologists makes him eminently suitable to be the author of such a book. In its pages there is to be found a tremendous amount of information concerning mycological problems in agriculture and horticulture. The groups of bacteria and fungi containing pathogenic genera are described, the causal organisms, host symptoms, and methods of control are briefly but clearly dealt with. One chapter deals with virus diseases and another with non-parasitic diseases—the latter is rather short.

A full list of references to recent literature is given at the end of each chapter, and there are many references to standard books on the subject-matter.

The book is up to date, and plant pathologists will find it a most useful addition to the existing literature.

" Comparative Morphology of Fungi." By Drs. Gaumann and Dodge. (McGraw Hill, New York, 1929.) 37*s.* 6*d.*

As the title implies, this book deals with the systematic classification of fungi according to the structure of their vegetative and reproductive organs.

It is a translation and revision of Gaumann's " Comparative Morphology of Fungi " made by Professor Dodge of Harvard University. The translation has been carried out in such a way as to convey the ideas in as idiomatic English as possible without in any way altering the theoretical discussions. With the author's approval some rearrangement of the book has been made and the results of recent work incorporated where possible without changing the discussion. In certain cases it was found necessary to re-write the discussion owing to the large amount of new literature presented since the original.

As might be expected, the Bacteria and most of the Myxomycetes are not considered and the Fungi Imperfecti are only briefly dealt with. The phylogenetic discussions from the original are given and are freely criticized—the author's conclusions are then given, many of these being based on the results of his own investigations. The bibliography is here presented as one chapter at the end of the book and contains over a thousand references to literature. To the original number of excellent illustrations about a dozen new ones have been added.

Mycologists interested in this branch of the subject should find this a very useful book.

" A Textbook of General Botany." By G. M. Smith and others. 8vo. 527 pp. (Macmillan, New York, 1928.) 16*s.*

A thoroughly well-illustrated general textbook of botany which should prove of value to the first-year student attending university classes in this subject.

The subject-matter deals with both flowering and flowerless plants and contains chapters dealing very briefly with such general topics as plant evolution and distribution and variation.

" A Textbook of Botany." By J. M. Lowson. Edn. 7. Revised by L. C. Fox. (Univ. Tutorial Press, London, 1929.) 9*s.* 6*d.*

Whilst slight alterations have been made and technical terms brought up to date the general arrangement of the book has not materially changed.

This book is only to be recommended to those students who wish to revise their reading rapidly for examination purposes.

" Einjahrsblumen." By P. Kache and C. Schneider. 4to. 203 pp. (Gartenschonheit, Berlin, 1928.) 9.50 m. Paper.

This is the second edition of the excellent book on Annuals already noticed in this JOURNAL on its first appearance in 1924.

It contains some excellent coloured illustrations in addition to a host of black-and-white pictures of individual plants and of gardens.

After discussing "What is an Annual?" the authors give a short account of the history of annuals in gardens and then go on to describe the species and their varieties that find a place in present-day gardens. Then follows an account of the methods of using the plants in gardens and parks, directions for their treatment, and lists for the different months, lists arranged according to colour, and so on.

For those who read German this is a book we can recommend most highly. We have nothing quite so comprehensive or so well illustrated in English.

" Fruit, Flower and Vegetable Trades Year Book and Diary." 4to. (Lockwood Press, London, 1929.) 2*s.* net.

A diary " for all engaged in the industry of raising and distribution of Fruit, Flowers, and Vegetables."

In addition to the usual features of a diary there are excellent articles on Mushroom growing (by W. Dyke); cold storage; manuring of vegetables; florists' work; and so on. It is a very useful work for its purpose.

" Sweet Peas: their History, Development, and Culture." By C. W. J. Unwin. Ed. 2. xi + 192 pp. (Heffer, Cambridge, 1929.) 2*s.* 6*d.* net.

Very quickly after its first appearance in 1926 a second edition of this excellent book on Sweet Peas has been called for. The opportunity has been taken to make one or two points clearer and to include the newest of the novelties with acute comments upon them. It is a book every would-be grower of Sweet Peas should have.

" Peonies, The Manual of the American Peony Society." Ed. by J. Boyd. 8vo. 336 pp. (Amer. Peony Soc., 1928.)

Literature of the Pæony is not by any means plentiful, and if one desired to obtain information on the modern Pæony it could only be done by a large number of references to articles in Garden Journals, Bulletins, etc. The American Peony Society is to be congratulated on the publication of this most authentic and comprehensive manual.

The general cultivation of the Pæony has received much greater attention in America during the past thirty years than it has in Europe, and that is largely due to the efforts and enthusiasm of the members of the American Peony Society, who have "boosted" the flower as only Americans can. That the Pæony succeeds in every zone of the States from the Atlantic to the Pacific is also one of the chief factors in its great popularity. Its simplicity of culture is also greatly in its favour.

This manual will be invaluable to all growers of Pæonies, and particularly to commercial growers, as it contains a complete classified list of known varieties of Pæonies with synonyms, together with points representing their value as voted by the Directors of the American Peony Society—10 represents the maximum points given to any variety. Any variety receiving less than 7·5 marks is recommended to be discarded. A scrutiny of these marks shows that those varieties which do best in America generally also do best in Britain.

There is an article on Pæonies for market which deals with the latest experiments in the cold storage of Pæony flowers. Experiments on these lines have been made in England for two or three years, and there is the probability of great development. The notes by Mr. Little on the best varieties for cold storage will be helpful to growers on this side the water.

The list of varieties valuable for cut flowers is not one to be closely followed by English growers—' Alsace-Lorraine,' ' Mme. Emile Galle,' ' Souv. de l'Exposition Universelle,' and ' Modeste Guerin ' are shy bloomers in this country, and the red varieties find no favour on the market. ' Mons. Jules Elie ' has weak stems. The other varieties are all good.

The chapters on growing and propagating are excellent, but to most growers the article on "Fungoid Diseases and Pests of the Peony," by Freeman Weiss, must be the most valuable in the manual. It deals in such a lucid way by description and illustrations of diseases that one cannot fail to diagnose them, and if the advice given is followed the troubles can be remedied.

Anyone desiring to raise Pæonies by intercrossing will find Professor A. P. Saunders' article of great help.

The "Peony Don'ts" on page 218 are worth the cost of the manual to the uninitiated amateur grower.

There is also an excellent chapter on "The Moutan Tree Peony," by J. C. Wister.

The manual is beautifully produced. It contains seven coloured plates which are so good as to be almost above criticism, and the thirty-four half-tones are of a very high order.

"The Motor Mechanism of Plants." By Sir Jagadis Chunder Bose, F.R.S. 8vo. 429 pp. (Longmans, Green, London, 1929.) £1 1*s*.

The nature of this publication is indicated in the preface in which the author states that: "This is one more of the series of volumes in which an account of my researches on plant physiology has from time to time been given. The present volume deals more particularly with the investigation of the motor mechanism of plants as compared and contrasted with that of the animal."

The section of plant physiology particularly concerned with the movement of plant organs, centres round work carried out with relatively few species, including the well-known "sensitive" plant *Mimosa pudica*. By delicate, beautiful, and cunningly constructed instruments, which in themselves constitute no mean advance in technique, the author has been able to extend the number of plants in which movement can be observed, and to include in this group species of *Erythrina* for example. The relative magnitude of some of the movements studied, however, was of such an order that a magnification of approximately 1,000,000 times was sometimes employed for recording the results in graphical form.

As the result of the study of the action of drugs, both stimulants and poisons, on the motor mechanism of the cells in the pulvinus of the sensitive plant, the author emphasizes the similarity of response shown by plant and animal tissues. More obvious differences in structure, environment, and response characteristic of these different tissues are not stressed. The hypothesis that the ascent of sap is due to the pulsation of cells of the cortex of the stem, which the author advanced previously in his earlier publication, is here further elaborated.

One hopes that instruments of similar precision will be available for other workers to repeat the described experiments. Professor Molisch of Vienna has reported in "Nature" that he has been able to repeat some of them.

Throughout the pages charts illustrate the results obtained graphically. There are also diagrams and photographs to help the reader to appreciate the author's technique. The text is singularly free from irritating small errors. The jaded reader of scientific papers may be refreshed by the author's style in which the use of the personal pronoun figures prominently. He may almost hear the magician say smilingly: "Watch carefully, whilst further marvels of plant movement are produced." The critical plant physiologist may find it a profitable exercise to advance alternative hypotheses to explain the results of some of the experiments.

"Creation by Evolution." Edited by Frances Mason. 8vo. 371 pp. (Macmillan, London, 1928.)

This is a series of essays by well-known American and British specialists, who deal authoritatively with their own branch of biology, and present a summary of the evidence upon which the theory of evolution rests. The style and form of each essay has been carefully considered so that this work will be appreciated by the general reader.

Those interested particularly in plants will perhaps turn first to the chapter dealing with the plant life of past geological eras; the rise and decline of the great phyla of plants; and the emergence of the seed-producing plants which followed the period of dominance of ferns and other spore-producing plants.

We hope the brilliant essay on the development of the social life of the bee will not escape the notice of any naturalist, be he horticulturist or not. Enriched by those whimsical touches and shafts of genuine humour so characteristic of its author, the late Sir Arthur Shipley, it forms a short but very clear description of the life of the solitary bees and of the intermediate species which bridge the gap between these bees and the highly organized social life of the hive of the honey bee.

The conspicuous success that has attended the work of the American School of palaeontologists is briefly, too briefly perhaps, dealt with in those chapters concerned with the fossil history of the great reptiles and the early mammals. These in themselves provide evidence more than sufficient for any "Fundamental" controversy. Moreover, there is no good reason to doubt that as the vast, fossil-bearing strata of the American (and other) continents are further explored additional series, perhaps even more complete and impressive than the classic example of the limb of the horse outlined in this book, may be reconstructed for us.

Other chapters deal with the comparative development of the brains and minds of our simian ancestors, and a highly entertaining account of the careful studies of the mental capabilities of the modern monkeys is included.

For the philosophical, Professor Lloyd Morgan analyses those qualities associated with mind and reflective thinking, but he has not this time enlarged upon his idea of emergent evolution.

This book therefore forms an admirable companion volume to the Life of Darwin reviewed above, from which the general reader is able to judge of the solidity of the superstructure erected by that master builder and here is additional strengthening material for the foundations.

"Dahlias." By F. F. Rockwell. 8vo. (The Home Garden Handbooks.) 85 pp. (Macmillan, New York, 1929.) 4*s.* 6*d.* net.

This book is of particular interest to growers of Dahlias on this side of the Atlantic, illustrating as it does the types and methods of cultivation approved by our American cousins.

Many suggestions are quite foreign to British ideas and it is well that anything new or novel in culture should be in the hands of growers.

Size and colour are strong points with American enthusiasts, and although British cultivators as a rule favour smaller flowers the attraction of size is becoming more pronounced.

The weakest part of the volume seems to be the illustrations, which do not convey as they ought the true characteristics of the types they are supposed to represent.

Tobacco is apparently used as a manure at the rate of four or five pounds to one hundred square feet, but in what form is not divulged. Cultivation in America seems to be attended with many of the difficulties experienced in this country.

"Fertilizers and Manures." By Sir A. D. Hall. Ed. 3. 8vo. 414 pp. (John Murray, London, 1929.) Price 8*s.*

In this country one of the most remarkable features of agriculture and horticulture since the war has been the rapid development of the chemical industries concerned with the manufacture of artificial fertilizers and manures. Prominent business houses have devoted much capital and labour to investigating the effect of manures upon the growth of crops: more especially has the effect of nitrogenous fertilizers received attention.

A discussion of such topics and a description of the methods employed nowadays in the manufacture of fertilizers are among the interesting points dealt with in this enlarged and revised edition of this well-known book. To those who seek any information regarding the nature and use of artificial manures and fertilizers we recommend it. Whilst there is much information of value to the specialist, the simple and clear style of the writer ensures that the practical grower too can readily find much to interest him.

The tables and illustrations are satisfactory and the price is reasonable.

"Horticulture Enterprises." Ed. by G. Kary Davis. Ed. 4. 8vo. 466 pp. (Lippincott Co., Philadelphia and London, 1929.) 10*s*. 6*d*.

This volume is designed as a textbook for American High Schools and normal schools, and follows the practice, so the foreword says, adopted in recent years at Technical Institutes for Horticultural Instruction, where the various branches of Horticulture (designated by the term "enterprises") are divided into "jobs."

Eighteen such "enterprises" are analysed in this book for the student, each chapter being contributed by a teacher well versed in his own subject.

The book is well illustrated, and we have no doubt it may meet with success in America, but it is hardly suitable as a textbook for students in this country, where not only are the crops and climate different, but also the educational aims themselves diverge from the standard portrayed in this volume.

"Agricultural Entomology." By D. H. Robinson and S. G. Jary. xi + 314 pp., 149 figs. (Duckworth, London, 1929.) 15*s*. net.

This work appears to be an elementary textbook for the use of agricultural students and intelligent farmers. The general composition is good and there are excellent figures and photographs with which the book is profusely supplied.

The scheme has been to arrange the subject-matter in two parts, the first dealing with the elements of Entomology and the second with a discussion of the principal insect pests of farm crops, arranged under their respective orders. A few lines beneath each species are devoted to its life history, host plants, damage done, and control measures. Two other chapters deal with the principles of insect control and the composition and application of insecticides. Three Appendices are attached: Appendix I discusses other Arthropoda of economic importance such as woodlice, spiders, mites, centipedes, and millepedes, whilst eelworms and slugs and snails, and methods of collecting and preserving specimens are dealt with in Appendices II and III respectively.

The only criticism that can be made with regard to the photographs of the insects is the absence of any guide as to their relative sizes. *Phyllotreta* and *Anobium*, figured on pp. 137 and 141, should be transposed.

The section on Biological Control (pp. 256–257) cites the case of *Aphelinus mali* and Woolly Aphis, but omits the more successful case of *Encarsia* and its control of the greenhouse white fly in this country.

The results from trials with alcoholic extracts of Pyrethrum carried over a period of years show that solutions of this plant are highly toxic to many species of phytophagous insects, and yet the information given (p. 266) is that the use of Pyrethrum is "confined to animals and buildings."

It is unfortunate that there is no warning given against the danger attending the use of Tetrachlorethane in greenhouses (p. 267), for several species of plants are particularly susceptible to damage by the fumes of this material.

It is as yet unproven that sulphate of potash kills eelworms (p. 295); the value of the addition of this artificial fertilizer to infected plants depends rather on the physiological effect produced on the tissues of the plant.

The book concludes with a very brief bibliography which is a disappointing feature.

"The Principles of Applied Zoology." By Robert A. Wardle. xii + 427 pp., 55 figs. (Longmans, Green & Co., London, 1929.) 21*s*. net.

This book is an attempt at what would appear to be an impossible undertaking, for the author has endeavoured to confine within the compass of four hundred pages a survey of the whole field of applied zoology that will be, in the words of the author, "sufficiently informative to be of value and interest not only to the student of zoology, but to the student of agriculture or of medicine, and to the general reader."

The work is divided into four parts, viz.: (1) Medical and Veterinary Zoology, (2) Agricultural and Horticultural Zoology, (3) Animal Industries, and (4) Bibliography and Index.

The first part has chapters dealing with Protozoa, Helminthes and Arthropoda and Disease.

The second part will be found to be of considerable interest to the agricultural and horticultural entomologist, for amongst the twelve chapters seven are devoted to insect pests in all parts of the world under the chapter headings of Soil Organisms, The Categories (2), Life Cycle, Distribution, Behaviour and Mortality Factors. The remaining five chapters deal with vermin repression, bird encouragement, animal domestication, types and breeds of farm animals and livestock breeding.

The third part contains chapters on bee-keeping, sericulture and lac culture, inshore and offshore fisheries, whaling and sealing, fur-bearing animals and animal conservation.

Part 4 consists of a useful working bibliography arranged under subject headings, and it is here that the discriminating and selective faculty of the author with regard to the inclusion of literature will be realized and appreciated.

The difficulties in the preparation of an original work are great, but the author has surmounted them so successfully that he has been able to compress within the covers of a single volume a *résumé* of the vast accumulation of applied zoological knowledge.

"The Problems of Applied Entomology." By Robert A. Wardle. xii + 587 pp., 31 figs. (Manchester University Press, 1929.) 30*s.* net.

The present volume is supplementary to the work entitled "The Principles of Insect Control" published in 1923 (R.H.S. JOUR., **49**, pp. 271–272). The scope of the book is, with certain exceptions, widened, whilst cognizance has only been taken of entomological work that has appeared since 1922.

The scheme of presentation is altered and the book divided into three parts.

Part 1 (247 pp.) deals with General Problems under chapter headings of Host Resistance, Climatic Resistance, Tropic Behaviour, Disease, Parasites and Predators, Theory of Insecticides, Stomach Poisons, Contact Insecticides, Fumigants and Combination Insecticides and Cultural Influence. In this section are found clear accounts of some of the more recent additions to our knowledge of virus diseases and their transmission by insects (pp. 28–30); biological control of weeds (pp. 31–33); tropic behaviour and its economic application to insect control in the form of attractants and repellents (pp. 90–99); and a greatly enlarged section dealing with insecticides.

Part 2 (271 pp.) breaks new ground in entomological literature in that there is a detailed discussion on "Area Problems." The first eight chapters review the problems which beset the applied entomologist in various parts of the world viz.: South-Eastern Asia, the Mediterranean area, West Africa and Central America, North-Western Europe, the Euro-Asiatic Plains, North America and South America, South Africa, and Central and East Africa.

The concluding chapters are entitled "Locality Disinfection" and "Locality Protection." The penultimate chapter deals with restriction of spread of an insect pest in a confined locality, the eradication of an important pest after its entry into a new and restricted area, and the hygienic methods of crop storage. The final chapter discusses Legislative and Quarantine Methods which are in operation in various countries.

Part 3 (67 pp.) comprises a classified bibliography, an index of authors and a subject index. The bibliography is necessarily comparatively brief and the papers quoted are chiefly those which have appeared during the past seven years.

The book, with its compilation of facts relating to the work of applied entomologists in various regions of the world, is a great undertaking and one which will gain for the author the gratitude of all whose work deals with the application of scientific principles to the control of insect pests. The digest of literature during recent years makes it imperative that this work shall share a place with "The Principles of Insect Control" in the library of both the research worker and teacher in the ever-widening field of economic entomology.

"The Scientific Principles of Plant Protection." By Hubert Martin. 316 pp. (Arnold & Co., London, 1928.) Price 21*s.* net.

It is a source of gratification to entomologists and mycologists that a book dealing with the general theory of plant hygiene has at last appeared in English. The numerous facts bearing upon the question of "Plant Protection" have frequently been dealt with by botanists and plant pathologists, whilst the work under consideration, written by a chemist, sheds light on the subject from a different angle.

The title is distinctly misleading and tends to produce an incorrect impression as to the contents of the book. The title could be improved upon so that the implication is that the chemical side of the subject is predominant.

The chemical, mechanical and biological aspects are dealt with in sixteen chapters, which are divided into sections and subsections under the chapter headings of Plant Resistance, Fungicides, Insecticides, Weed-killers, Fumigants, Seed and Soil Treatments, Biological Control, Traps and the Treatment of the Centres and Vectors of Infection. Following some introductory remarks to each section, the work of investigators who have made contributions to the subject under discussion is summarized and references given.

To produce a comprehensive survey of the vast amount of literature on the subject of Plant Protection is a laborious task, but one is inclined to wonder at the omission of certain outstanding papers dealing with plant resistance and biological control.

The helminthologist will be interested to read (p. 4) that Nematodes are "true worms with ringed bodies," whilst some disappointment is felt after reading the scanty remarks on plant parasitic eelworms. It may be stressed that *Tylenchus dipsaci* is as important a pest of economic plants as *T. tritici*, yet no mention is made of the former species. Dealing with "bridging species" (p. 277) in relation to *Erysiphe graminis*, an excellent opening is made for the introduction of Quanjer's work with parasitic eelworms and the probably important part that "bridging hosts" play in the survival of these pests.

One of the most successful cases of biological control of a pest in this country—the parasitism of the greenhouse white fly, *Trialeurodes vaporariorum*, by the Chalcid, *Encarsia formosa*—deserves mention.

The work is provided with author and subject indexes.

Plant pathologists will welcome the book and will congratulate the author on having summarized and condensed the vast amount of literature into the space of three hundred odd pages, which enables one to discover speedily the alternative methods of control open to him.

"The Origin of a Land Flora." By Prof. F. O. Bower. 8vo. 27 pp. (Macmillan, London, 1929.) Paper. 1*s*. net.

This is the Huxley Memorial Lecture and in it Prof. Bower has taken the opportunity to review the criticisms which his earlier work called forth in the light of the knowledge that has been attained since the publication of that volume in 1908. It is necessarily technical in character, and draws material for argument from both botanical and geological sources. Those who desire to know the present position of the problem of the origin of flowering plants will find it set out clearly here.

"Lawns." By F. F. Rockwell. 8vo. viii + 87 pp. (Macmillan, New York, 1929.) 4*s*. 6*d*. net.

The author says that much of English practice in lawn making has had to be unlearnt in dealing with American conditions. It is therefore useless to criticize its recommendations in the light of British experience.

We have, of course, many books and pamphlets on lawn making and maintenance, and on the whole there is little difference between good American and good English practice. Even the mixtures of grasses proposed for America are similar to those used here in spite of the difference in climate.

"China: Mother of Gardens." By E. H. Wilson, M.A., V.M.H. la. 8vo. x + 408 pp. (Stratford Publ. Co., Boston, Mass.) 1929.

In 1913 Mr. E. H. Wilson published the account of his travels in search of plants under the title "A Naturalist in Western China." This book has been out of print for some time and the present book is based upon it. The author tells us "the material used has been amended and thoroughly revised, and new illustrations added." The result is a very interesting account of Mr. Wilson's journeys in Western China from 1899 to 1911, first on behalf of Messrs. James Veitch, later for the Arnold Arboretum. The quest started at Ichang and went on over forest and woodland, mountain and valley in inland China far from the region well known to the Western world where Fortune and others searched, through Hupeh and into Szechuan, over the Chengtu Plateau, into the mountains of N.W. Szechuan, and along the Tibetan border—a rich country for the botanist, perhaps the richest of any temperate region in the world—then but very imperfectly known, though previous travellers had given an inkling of what might be expected, especially the French missionaries, like the

Abbé Delavay, and Dr. A. Henry of the Chinese Customs. The herbarium specimens that had come home made us want seeds. Those Wilson went to fetch, and he had wonderful success. This is the thing he has to tell of.

In the telling there are interesting notes on topography and soil, on the people, their industries, and their manners and customs, and on their houses and temples.

It is no small thing to have introduced to our gardens 1,800 new plants. Perhaps Mr. Wilson counts the great lily which is called *Lilium regale* as the best, but we prefer even now to suspend judgment, for some of his "finds" have still to show their capabilities. Further, he was the forerunner of an active band of collectors. After him went Purdom, Forrest, Farrer, Cox, Schneider, Ward, Handel-Mazzetti, Hers, Rock, and others; all have found fresh plants, and our gardens have been thereby enriched, so no wonder out of so rich a storehouse an interesting story should come.

Those who have no copy of "A Naturalist in Western China" should get this book as an aid to the understanding of the conditions in which so many of the plants now common in our gardens grow naturally. Those who have it may wish for the new presentation and the fresh illustrations.

The publishers' part has been well done. Paper, print and illustrations are alike excellent, and the general "get-up" suitable to the book.

"Hardy and Half-hardy Plants." Ed. by A. W. Darnell. la. 4to. (Darnell, Hampton Wick, 1929.) Monthly, 2*s*. 6*d*.

This is a new periodical publication, a monthly magazine for amateur and professional gardeners, with illustrations mostly in black and white and descriptions "of beautiful and interesting plants suitable for outdoor culture in the British Isles." The first part appeared in May 1929. It contains figures of *Incarvillea Delavayi* (coloured), *Magnolia parviflora, Silene Schafta, Campanula sarmatica, Lazuriaga marginata, Allosurus crispus, Elliottia paniculata, Delphinium cardinale, Campanula Zoysii, Brodiaea uniflora, Clintonia uniflora, Roscoea cautleoides, Pyrola asarifolia* var. *incarnata, Calochortus pulchellus, Clematis cirrhosa, Omphalodes verna, Impatiens biflora, Polygala pauciflora, Codonorchis Lessonii, Sedum spathulifolium*, and *Linaria maroccana hybrida.*

The drawings are not all equally successful, for the habit of the plant is not always conveyed by them and one might complain with a certain amount of truth that in some instances the form is too conventionalized. *Epigaea repens* is an instance. *Philesia buxifolia* looks like a small tree and we are told it grows "one to four feet tall." It may do so in its native home, but in cultivation rarely attains nine inches.

Notes on cultivation are given for each plant already introduced to gardens, and these notes should prove helpful. We read, however, that *Allosurus crispus* (contrary to our experience) succeeds in cultivation in well-drained peaty soils; it is, so far as we have seen, very difficult to establish. *Campanula Zoysii* is described, too, as an easily cultivated plant, yet it is always regarded as an especial treasure where the cultivator succeeds in keeping it.

"Stephen Hales, D.D., F.R.S. An Eighteenth-Century Biography." By A. E. Clark-Kennedy. xii + 256 pp. (University Press, Cambridge, 1929.) 15*s*. net.

This is an excellent biography of an eighteenth-century man of science, who may be called the father of vegetable physiology. Stephen Hales was at Corpus Christi College, Cambridge, from 1696 to 1709 and then became perpetual curate of Teddington, Middlesex, and Rector of Faringdon, Hants. He resided at Teddington, and there, after he left Cambridge, most of his experimental work was done. He lived at a time remarkable for scientific progress in England, and it is not too much to say that with the exception of the piece of work that gained him the Copley Medal of the Royal Society, his experiments and the deductions he drew from them illuminated all he ventured upon. He pursued science for the sake of acquiring knowledge, not for the benefit that knowledge might bring, and some of his experiments with animals brought blame upon him for cruelty. By them he gained much knowledge of the circulation of the blood, and he turned then to investigations concerning the circulation of sap in plants. He lived before the day when pursuit of knowledge of natural history was regarded as opposed to true religion—that phase came later—and in his "Vegetable Staticks" and elsewhere he proclaims his outlook to religion as strengthened by his investigations. All this, his experiments and their results are set out clearly and plainly, and the position they occupy in regard to work done before and since is clearly defined.

Furthermore, it is demonstrated that his preoccupation with science did not lead to neglect of his parochial duties, nor of those larger duties that fall to every man of affairs, if he fulfils his life. One instance we may quote: the part he played in the passing of the Gin Act, an Act that did not a little to stem the tide of intemperance that swept so many away in the early eighteenth century. Ventilation of ships and buildings, experiments on many things claimed his attention, but for these the biography must be consulted.

Dr. Hales had little direct connexion perhaps with horticulture, though his sympathy with it is evident through his friendship with Pope, but his experiments explained certain facts in the physiology of plants and led to modification of practice in directions in which we are progressing even to-day.

"An Introduction to the Chemistry of Plant Products." Vol. II. 2nd Ed. Metabolic Processes. By P. Haas and T. G. Hill. 8vo. 220 pp. (Longmans, Green & Co.) 10*s*. 6*d*.

This small volume forms a companion, almost a supplement, to the well-known standard textbook of the authors' dealing with the chemistry of plants which has now attained its fourth edition. It is the authors' intention to depict for the senior student a clear outline of the metabolic processes of the plant; so they have, and wisely we think, refrained from reviewing *in extenso* the literature, but have rather presented a statement of present knowledge likely to serve as a sound basis for further work.

Recently several monographs dealing in full detail with some chapters of plant physiology have been published; for example, those of Stiles and Spoehr on photosynthesis, and we find that in this short account the more important results of workers in these fields of research have not been overlooked. Approximately half of this book deals with the photosynthetic, and oxidation or respiratory, processes of the plant. The senior student studying where he cannot enjoy the stimulus of personal contact with investigators into assimilation and respiration will particularly appreciate these chapters. The chapters dealing with the fats and the proteins are comparatively brief.

Although the various reactions facilitated by enzymes are discussed in relationship to the metabolic processes considered, the absence from this volume of a chapter dealing generally with enzymes is perhaps surprising. One must refer for such considerations to Volume I.

The grower of plants who is concerned with their utility or beauty will find the last chapter, dealing with "Growth," of more direct interest. In the brief space of some fifty pages one finds a short discussion of normal growth rates, growth stimulus, electro-culture, hormones, and influence of light upon the growth and habit of the plant; so that it is possible for the student to realize the lines upon which new work is being carried out. On page 203 the authors state that: "The importance of food is so obvious a factor governing growth that its consideration would appear unnecessary; but the significance of certain raw materials, more especially inorganic substances, is so marked as to warrant some mention." Thus the authors, we see, do not deal with the results of those workers who have studied the relationship of the various ions requisite for normal growth. It is difficult to avoid the impression that the processes carried out, more particularly by the leaf, are dealt with more fully than are the processes dependent on the action of the roots—a reflection upon the state of our knowledge.

The book having been designed primarily for senior students of botany, the authors' viewpoint even in the chapter dealing with growth cannot be agronomic. Very unfortunately this precludes any mention of "Yield"—one, and perhaps the ultimate expression of growth and the underlying metabolic processes governing that change; moreover, this expression of growth is of fundamental and economic interest, particularly to the horticulturist.

In conjunction with the authors' previous volume, this book can be strongly recommended to students.

"Rock Gardens: How to Plan and Plant Them." By A. Edwards. 8vo. 320 pp. (Ward, Lock & Co., London, 1929.) 7*s*. 6*d*. net.

Into a garden with which we are familiar many plants almost unknown in books not infrequently come, for the overlord thereof is a keen collector. The head gardener, we fancy, must sometimes be hard put to it to know where to dispose the new acquisitions, for he has no flair therefore, good cultivation being his forte, and when a plant more troublesome than most to place comes his way his last resort is to send it to be planted in the rock garden.

After reading this book one of the impressions left upon one's mind is that that head gardener is following the recognized course, for the list of plants described as suitable for the rock garden or for the "wall, paved, marsh, and water gardens" with which the book also deals, as the title tells us, is very catholic indeed.

The second impression left is of the vast industry of the author, who must have spent a tremendous time in compiling the lists he gives and gathering together the notes on the plants which are grouped in the "Alphabetical List of Plants for the Rock, Wall, Paved, Water, and Bog Gardens: showing the Detailed and Individual Culture, also the Best Species and Varieties," occupying pp. 143–304.

The consequence of this is unfortunate, for many things are included that ought not to be admitted into the rock garden unless it be on a huge scale, and that certainly do not merit the name of "rock-plant." Too often, too, things that like a peaty soil are included among those that thrive in a "bog or marsh garden." Our author has overlooked the difference—a very real one it is—between a bog and a peat moor. It is evident that no distinction is made, for such things as *Pieris floribunda*, *P. formosa*, and *P. japonica* are recommended for the bog or marsh; but it is when we meet such a paragraph as that headed *Philadelphus* that we feel most astonishment. The members of the genus are, we are told, "Beautiful, hardy, dendrous shrubs belonging to the Syringa genus." They most assuredly do not. "Some of the dwarfer kinds are frequently grown in the rock garden." Very well; but then we look at the list, which is *P. coronarius* (12), *P. microphyllus* (5), *P. Lemoinei erectus* (6), *P. virginale* (8), *P. purpureo maculatus* (5). We have transcribed the names as printed. We are warned that these grow from 3 to 10 feet high, but we are not told which grows 3 feet nor how much through we may expect them to attain. We have marked their probable height in brackets.

There are beautiful Pentstemons for the rock garden, but this book would overload it with such good border plants as Newbury Gem and Southgate Gem.

We might quote much more to similar effect from this book, which ought to be authoritative, but which leaves so much to be guessed at. If it be for the beginner, it ought to have been realized that he does not know enough to guess the truth. What can he learn from the statement that the height of the different species of Osmunda varies from 1 to 8 feet when he is left without indication of the height to which the only one mentioned, *O. regalis*, reaches? If it be for the hardened amateur of rock plants, it is almost equally wanting. What good can it do him to be informed that *Cryptomeria japonica* can be propagated by sowing seed in March or April, when the sentence before says, with some disregard of accuracy, that *C. japonica nana* is a dwarf species that may be grown in the rock garden? He may be able to guess that that dwarf variety (if it set seed) would probably not give dwarf seedlings. But why leave him to guess?

What an opportunity has been lost! What a pity, when Great Britain is looked upon as the home of the greatest of rock gardens, to put out a book so undigested as this!

"Rose Growing." Edited by J. N. Hart. 8vo. 128 pp. (Ward, Lock & Co., London, 1929.) 1*s*.

This little book is an excellent shillingsworth, and contains more useful information than many more expensive manuals.

Cultural directions are short but sufficient, and after a chapter on manuring the writer soon gets in a description of the most useful garden roses.

With so many new and often attractive roses as are now produced yearly, the task of selection is by no means an easy one, but the editor has on the whole performed his task well, and his choice of varieties, particularly among the garden roses, may be followed with some confidence.

Having regard to the size of the book quite a large section is devoted to some of the older forms and the wild roses of this and other countries usually classed by rosarians as the "species."

Pruning and propagating are discussed and the relative merits of various stocks upon which the modern rose is worked; a chapter is given to diseases and pests, and the book concludes with a calendar of operations to be undertaken during the year.

A satisfactory feature of this little book is that the editor is able to appreciate the many-sided character of the rose: as an exhibition flower; a plant for garden decoration; for cutting for the house; or as a flowering shrub for use in the wild garden. The last-named use is one which has been brought into prominence in recent years by the introduction into gardens of numerous Asiatic species with fine fernlike and beautiful foliage, such as *R. sericea*, *Soulieana*, *setata*, *Hugonis*, *multibracteata*, and many others which give an interest to the wild garden after the somewhat short period of flowering is over.

The principal theme of the book, however, is the garden rose, and this has been developed by a man with an intimate knowledge of the flower, and in a more satisfactory manner than one usually meets with in attempts to bring older manuals up to date.

The chief objection to the book is its paper binding, which must be ephemeral, and an alternative in cloth binding should have been offered.

"Horticulture: Elementary and Practical." By G. W. Hood, M.Sc. Ed. 3 8vo. 382 pp. (Kimpton, London, 1929.) 15*s*. net.

This is another book intended for the instruction of American students in high schools, and it was "prepared especially for those interested either in home or commercial horticulture."

American horticulture differs so fundamentally from our own that we cannot regard the book as suitable for students here. For instance, the basis of English cultivation in the garden is the spade, but if we turn to p. 79 and the section "Implements of Cultivation," we find plows and harrows figuring very largely and "in addition to the above we can mention the garden spades, rakes, and hose" (*sic*) as instruments for the improvement of the soil. That is all.

In common with many American school-books and some English this concludes each chapter with a series of review questions. We cannot refrain from quoting from the last set concluding the chapter headed "Beautifying the Home Grounds." Here are some: "13. Discuss the lawn. 14. How often should it be moved?" (We suspect "mowed" may have been intended!) "15. What is the value of regular mowing of the lawn . . .? 26. Which of the maples are most valuable and why? 27. Differentiate between the poplars. Where are they used? 28. How does the elm differ from the poplar? 29. Discuss the ash."

Now we read in the preface that the demand for this book which has led to the speedy preparation of a third revised edition has come largely from agricultural high-schools and colleges. We can but assume that horticultural education in these places consists largely in giving a chapter to read and then an examination on it by means of the questions provided. We know that many in the great country which saw its birth have aspirations towards the development of a horticultural tradition there, but we cannot think, if our assumption is right, that the boys and girls who are so "instructed" will have any feeling for real gardening or any skill in it, though they may be able to "Discuss the lawn."

"Catalogue of Lewis's Medical and Scientific Circulating Library." New ed. 8vo. 408 + ii + 167 pp. (Lewis, London, 1928.) 15*s*. net.

This useful catalogue is in two parts (in one volume), the first being an author index, the second a subject index of the books in the Lewis Circulating Library. The latter portion is particularly compact, giving under the main heading the name of the author concerned and the date of his publication with, in brackets, the chief text of the book, thus: "**Electrical Technology.** Betts (Lead Refining) '08; Pring (Furnace), '21," etc.

"Gardening under Glass." By F. F. Rockwell. Ed. 2. 8vo. xii + 287 pp. (De la Mare Co., New York, 1928.)

This is "a little book of helpful hints written particularly for those who would extend their gardening joys around the twelvemonth," so the title tells us. It is a second edition and has benefited by the revision it has undergone and by the aid of writers who have contributed portions out of their own special knowledge. It is of course a book for the amateur, and it will, we feel sure, guide him along what is probably a path he has not trodden before, for gardening under glass in amateurs' gardens is not yet a common thing in America.

We in England have not come to the end of the possibilities of gardening under glass, and one phase at least of it we shall see advance—the growing of alpine plants in suitable houses constructed for the purpose. There is nothing in this book on that subject, nor have we yet a comprehensive book dealing with it.

"The Wild Garden." By W. Robinson. Ed. 7. 8vo. 207 pp. (John Murray, London, 1929.) 9*s*. net.

It was a good day for those who love flowers when Mr. Robinson invented the Wild Garden and showed quite new ways of using a number of familiar plants, and especially of some that hitherto had not found their best places for use in the flower garden. His "Wild Garden" in the original form was published as far back as the year 1870. Since then there have been several editions, but the present book, the seventh, is considerably enlarged both in scope and detail, and should be carefully studied by those who have wild ground that they desire to make beautiful. Wild or waste ground or woodland may be of the most various character, but whatever it may be, a careful study of the book will indicate the plants, and manner of their use, that will be the most suitable. The book is fully illustrated by some of the best woodcuts that have been done in recent years: all the more enjoyable because it is now rare to see good examples of wood engraving, a beautiful art that has been unjustly but perhaps inevitably neglected of late years because of the general use of the cheaper forms of process from photography; but this charming and most helpful book has them in plenty and some of them are of rare distinction.

"The Book of Garden Animals." By E. Fitch Daglish, Ph.D. 8vo. 213 pp. (Chapman & Hall, London, 1918.) *7s. 6d.* net.

A useful guide to the fauna of our gardens for the non-scientific but inquiring gardener.

It is widely comprehensive, ranging from mammals and birds to spiders, myriapods, and insects. Butterflies and moths are excepted and regarded as too numerous to be treated in the available space.

The life-histories and most characteristic habits of the animals included are pleasantly and clearly set forth.

The five chapters devoted to reptiles and amphibians are particularly interesting. It is to be hoped that the excellent account of the legless lizard, generally known as the Slow-worm, will open the eyes of many to treat it as a most valuable friend to the gardener. Its chief food consists of slugs, fifteen at a meal being its idea of good living. Yet most people regard this pretty and harmless creature as a sort of snake to be killed at sight. The Smooth Snake is not likely to be seen in many English gardens, but it is as well to learn to distinguish it, lest this rarity should be killed also, in spite of the fact that it lives on Lizards and Slow-worms.

The statement that both ends of a severed worm can replace lost portions and recover is doubtfully true. The head portion can form a new tail, but tails seem to be incapable of producing a new head. The nest of the millipede, and the tiny shell on the tail of the worm-eating slug, Testacella, are worth learning to find. Earwigs do fly by night—but only occasionally—possibly only when they would a-wooing go. A readable book from which most people could learn a great deal.

"The Book of Shrubs." By A. C. Hottes. 8vo. viii + 371 pp. (De La Mare Co., New York, 1928.) $3.15 net.

This little book has been produced with the greatest care, and the result is a very reliable guide to those who contemplate planting shrubs—and who in these days can afford to neglect them? It is compiled for American gardens, especially those of the Eastern States and Canada (there is a special list of shrubs hardy near Ottawa), and naturally the emphasis varies somewhat from that which would be given here. The broad-leaved evergreens are less considered than they would be in England. The common holly, for instance, is not mentioned, probably because it proves tender in so many parts of the Eastern States and hardy in so few. *Berberis stenophylla*, an indispensable shrub here, is not mentioned, but neither is *Halesia tetraptera* (except in one list), and this must surely be an oversight.

Descriptions and comparisons between allied species are clearly given and frequently illustrated; the good and bad points of the shrubs mentioned are freely commented upon; the soil, pruning and other cultural requirements are fully detailed without unnecessary verbiage.

The illustrations are numerous and well reproduced, and the print clear.

It is a book which we can heartily commend to the beginner in shrub planting, for it is a sure guide and yet will show him that if he wishes he may pursue his subject much further.

Perhaps a word of warning as to names may be necessary, for the differences in usage between America and Europe are apt to cause confusion. This is seen, for instance, in Chaenomeles (*i.e.* Cydonia) where the specific names *lagenaria* and *japonica* are used in quite a different sense from that here.

"The Plant in Relation to Water. A Study of the Physiological Basis of Drought Resistance." By N. A. Maximov. Trans. and ed. by R. H. Yapp. 8vo. 401 pp. (Allen & Unwin, London, 1929.) *21s.*

Every horticulturist realizes that the water economy plays a very important part in controlling the activity of the ordinary plant; the gardener perhaps is generally more fortunate than his agricultural fellow, in that he can more frequently regulate the supply of water available for absorption by the roots of his plants. To a more limited extent he is also able to influence the rate at which water is given off by evaporation from the leaves through the stomata. This is accomplished by regulating the temperature, air currents, and sunlight or shade to which the plants are exposed.

Some 75 per cent. of the fresh weight of the normal plant may consist of water; so that the playful cynic who described the industry, of market gardening especially, as the " art of selling disguised water," is not so far from the truth ! Besides the water retained in the plant body, the normal plant growing where there is an adequate supply of water passes through the tissues from root, stem, to the leaf some five hundred parts of water for every one part of dry matter accumulated. The considerable rate at which the plant gives off water often tends to exceed the rate of absorption by the roots; then wilting phenomena appear.

In habitats in which the supply of water is limited, and more especially where climatic conditions favour also the rapid loss of water, the indigenous vegetation contrasts with the normal or mesophytic type. Such plants of dry regions—xerophytes as they are called—present many interesting facts for study, but they do not form a homogeneous group. Professor Maximov emphasizes the importance of classifying them, into drought-avoiding plants, like the ephemerals; succulents which store the available supply of water in thick fleshy stems or leaves; and the genuine drought-resisting species which bear, as best they can, the prolonged scarcity of water. Some exceptional species possess the power of recovery after a period of almost complete desiccation during which they are dormant.

The bulk of the text contains a critical consideration of the results of experimental work illustrating the laws relating to the intake and loss of water. Apparently some of our opinions require modification; it may surprise us to learn that xerophytic plants are not able to extract more water than can ordinary plants from the same soil. The amount of water available depends on the nature of the soil and not upon the species of plant growing in that soil. When an adequate supply of water *is* available many xerophytic plants give off by transpiration even more water than do mesophytes under similar conditions. From the critical discussion it is also apparent, as has been realized previously, that the opening and closing of the stomata does not depend solely upon the amount of water in the cells guarding the opening, and therefore cannot be such a very efficient regulatory mechanism for preventing loss of water as was once imagined. The true drought-resisting type possess the characteristic of enduring permanent wilting, and the power of subsequent recovery under more favourable conditions. It is only from a detailed and close study which has yet to be made, of the latter class of plant, that results of direct value to the plant breeder will be obtained: results which may enable him to select or breed new varieties of our economic crops likely to prove capable of withstanding adverse conditions in the field.

Instances are unfortunately only too frequent, even to-day, of scientific investigators in one country being ignorant of the results previously obtained by foreign workers; several such are cited in the text. Professor Maximov, who worked for a number of years at Tiflis, Georgia (Transcaucasia), and is now at the Institute of Applied Botany, Leningrad, introduces students to the results obtained by the Russian schools of vegetable physiology, some of which are not always readily available to the English and American worker. Therefore the frequent references to the original papers and the bibliography, and particularly the critical discussion of the results, are of much value.

The author was, as he acknowledges, fortunate in enlisting the co-operation as editor for the English edition of the late Professor Yapp, an eminent authority and critical worker in this branch of our subject. Professor Yapp enriched the discussion by illuminating references to his own and other Western European papers, and has throughout ensured that the translation is idiomatic and the meaning clear. Moreover, the text is free from irritating errors. English-speaking botanists are deeply indebted to him for this edition prepared during his long and last illness.

There can be no doubt that this volume will take at once a high place as a standard work, and prove of value to students of ecology, of crops, and of plants generally. For in it the nature of drought resistance is more clearly defined, in relation to the kindred problems involved.

" Flowering Plants of the Northern and Central Sudan." By Grace M. Crowfoot. 8vo. 25 pp., 163 full-page figures, and 9 photographic plates. (Wheldon & Wesley, London, 1928.) *7s. 6d.* net.

The 163 outline figures of this concise flora are a marvellous record of journeyings during ten years in the Sudan.

The flowers found by the gifted authoress were sketched in pencil and a wash of paint during the midday halts. Subsequently they were re-drawn in ink, and the result is this useful series of portraits of numerous plants of which figures were hitherto lacking. There is a great diversity in these figures, ranging from the beautiful large-flowered species of Hibiscus and Cotton to weird Euphorbias and a Caralluma, and back again to beauty among Ipomoea, Aloe and Thunbergia.

Each plate is accompanied by a severely condensed description, and certain items of information, the nature of which may best be shown by quoting one as a sample:—

"82. Albizzia amara; (Leguminosae). Arabic—Arrada. Large tree; flowers pinkish-yellow; pods thin, pale brown. Wood strong. Yields a gum. A. Flower magnified. B. Stamens and Stigma magnified. Reduced by $\frac{1}{6}$. Um Ruaba (Kordofan), C. Sudan."

This excellent book arouses a longing that some day every country of the world might have its flora treated in the same way.

"Plant Life and its Romance." By F. E. Weiss, D.Sc., F.R.S. 8vo. 136 pp. (Longmans, London, 1928.) 5*s*. net.

This small work provides an extensive bird's-eye view of the vegetable kingdom and its evolution and distribution.

It is written in simple language, and the sum of the labours of botanists and students of evolution is gathered into a continuous account so deftly that those who already know the facts will be charmed to find them so clearly marshalled, while others to whom they are new will find themselves led along to a wonderful revelation of the workings of Nature. It would form a delightful gift for children of all ages.

NOTES AND ABSTRACTS.

[For Index of Periodicals quoted see previous volumes.]

Acacia marginata R. Br. By O. Stapf (*Bot. Mag.*, t. 9124; Aug. 1927).—Native in S.W. Australia in woods, flowering in October and November. This is closely related to *A. myrtifolia* from the eastern part of Australia (see *Bot. Mag.* t. 302), from which it is mainly distinguished by the very hairy ovary.—*F. J. C.*

Aconitum anglicum Stapf (*Bot. Mag.*, t. 9088; Jan. 1926).—Until now the wild Aconite of Great Britain has been regarded as *A. Napellus.* Dr. Stapf believes it to be specifically distinct and calls it *A. anglicum.* It is confined to this country.—*F. J. C.*

Actinidia Kolomikta Max. By O. Stapf (*Bot. Mag.*, t. 9093; June 1926).—A rambling climbing shrub with leaves strikingly variegated white and pink in the early part of the year. Native of forests of the Amur region, introduced to England by Maries in 1877, and perfectly hardy. Fruit (and probably the female plant) rare, but comestible.—*F. J. C.*

Anagallis collina Schousb. By O. Stapf (*Bot. Mag.*, t. 9118; Aug. 1926).—A perennial pimpernel with orange-red flowers about ¾ inch across, with a purple centre, native of Morocco, Tunis, and Sardinia. Figured in *Bot. Mag.* at t. 831 as *A. fruticosa*, and known generally in gardens as *A. linifolia.*—*F. J. C.*

Androsace spinulifera Knuth. By O. Stapf (*Bot. Mag.*, t. 9072; Sept. 1925).—Regarded as synonymous with *A. strigillosa* v. *spinulifera* and *A. Prattiana*, this spiny-leaved Androsace from Western China has been introduced by Forrest and others. It occurs commonly on the edges of any shady pine forests and appears to resent winter damp in England. The flowers are large for the genus and rose to deep rose-purple.—*F. J. C.*

Anemone glauciifolia Fr. By O. Stapf (*Bot. Mag.*, t. 9114; Sept. 1926).—In describing this Western China species Franchet wrote *A. glaucifolia*, which is now corrected to *A. glauciifolia.* Introduced by Forrest, this is a difficult plant to keep alive in Western gardens. It bears deep mauve flowers about 3 inches in diameter.—*F. J. C.*

Apple Sawfly, The Control of. By F. R. Petherbridge and F. Tunnington (*Jour. Min. Agr.*, vol. xxxv. No. 11, Feb. 1929, pp. 1055–1059).—The serious damage caused by the larvæ of *Hoplocampa testudinea* Klug. has called for a serious attempt to be made to control the pest in commercial orchards.

The crop of Worcester Pearmains was increased from 30 lb. a tree to 65 lb. a tree by the application of two sprayings of Nicotine-Soap wash (nicotine, 95–98 per cent. 4 oz.; soft soap, 4 lb.; water, 40 gallons) applied five or six days after the petals have fallen and repeated seven days later.

Attacks of Aphides and Capsid Bugs are reduced by this wash.—*G. F. W.*

Apple Scab in the Wisbech Area, Successful Control of. By F. R. Petherbridge, W. R. Dillon Weston, and W. G. Kent (*Jour. Min. Agr.*, vol. xxxvi. No. 1, April 1929, pp. 45–51, 1 fig.).—Great success has resulted from the use of full and half-strength excess Lime Bordeaux mixture (10–3–40 and 5–1½–40) against severe attacks of Apple Scab on 'Worcester Pearmain' in the Wisbech area over a period of two years.

There was an average profit of nearly £50 an acre when Bordeaux Mixture was used as compared with a profit of £37 10*s.* an acre when Lime-Sulphur (1–30 and 1–60) was used.

Three applications were made—in the "pink stage," after flowering, and again three weeks later. The cost for each one worked out at about £4 in 1927 and £6 in 1928. The control plots showed a loss on the year's returns.

The point is stressed that varieties such as 'Stirling Castle,' 'Cox's,' and 'Lane's' are susceptible to injury by sulphur sprays and that varieties such as 'Beauty of Bath,' 'Allington Pippin,' and 'Lord Derby' suffer from Bordeaux Mixture.—*G. F. W.*

Aster Forrestii Stapf (*Bot. Mag.*, t. 9123; Aug. 1927).—Collected by G. Forrest and Handel-Mazzetti on Doker-la and in other parts of the Tibetan highlands, this is a hardy species growing about 4 to 9 inches high and bearing purplish flowers about 2½ to 3 inches across.—*F. J. C.*

Aster staticifolius Fr. By O. Stapf (*Bot. Mag.*, t. 9081; Sept. 1925).—Native of N.W. Yunnan. Erect in growth, but better under glass than in the open. Flowers purplish-blue, 2 inches in diameter.—*F. J. C.*

Berberis Hookeri Lem. By O. Stapf (*Bot. Mag.*, t. 9153; Oct. 1928).—Already figured as *B. Wallichiana* in the *Bot. Mag.* (t. 4656), and sometimes known in gardens under that name. The foliage figured is smaller, paler, and less glossy than that generally possessed by the plant grown under the name *B. Hookeri*. This evergreen, black-fruited species is said to be perfectly hardy, but it is rather badly damaged in many places in severe winters.—*F. J. C.*

Berberis replicata W. W Sm. By O. Stapf (*Bot. Mag.*, t. 9076; Sept. 1925).—An evergreen species, 4 to 5 feet in height, from near Tengyueh, introduced by G. Forrest in 1917. Flowering in early spring, flowers numerous along the young shoots, leaves narrow, abundant, turning partly red in autumn, fruits black. In common with many other illustrations of Barberries the present fails to indicate the grace of the species.—*F. J. C.*

Berberis Vernae C. Schneid. By O. Stapf (*Bot. Mag.*, t. 9089; Jan. 1926).—A species recognizable by its dense pendulous racemes of small flowers, and its small globose scarlet fruits. It was collected by Wilson, Purdom, and Farrer (No. 486) in West Kansu and Northern Szechuan. (The last collection is said to have been in 1815!) It thrives under ordinary British conditions and is quite hardy.—*F. J. C.*

Brunnera macrophylla Johnst. By O. Stapf (*Bot. Mag.*, t. 9110; Sept. 1926).—Well known and long grown as *Anchusa myosotidiflora*, now transferred to the genus *Brunnera* and with the specific name changed to *macrophylla*, the old name when it was included in Myosotis. A hardy plant liking partial shade and some moisture. Introduced from the Caucasus and widely distributed in gardens.—*F. J. C.*

Buddleia alternifolia Max. By O. Stapf (*Bot. Mag.*, t. 9085; Jan. 1926).—We have retained the spelling usually used for the generic name of this plant. Farrer sent home seed in 1914 and the plant is now widely distributed. It is distinguished by its alternate leaves and sessile clusters of purple or mauve sweet-scented flowers produced in June on the long shoots of the previous year. *F. J. C.*

Buddleia Farreri Balf. f. et W. W. Sm. By O. Stapf (*Bot. Mag.*, t. 9027; Dec. 1924).—Introduced by Mr. Farrer from near Siku in S. Kansu, and usually requiring some protection. Foliage very velvety beneath. Flowers rosy-lilac in large panicles.—*F. J. C.*

Cabbage Yellows, Resistance of sub-species of Brassica oleracea. By J. C. Walker and F. L. Wellman (*Jour. Agr. Res.*, 37; 1928, pp. 233–241, figs.).—Yellows is a disease apparently unknown in Europe, but the varieties of cabbage grown in America are all subject to the attack when planted in soil infested with *Fusarium conglutinans*. The wild cabbage imported from Europe was found, like practically all the European forms of *Brassica oleracea*, susceptible to attack in some degree, but was on the whole highly resistant as were Brussels sprouts and Broccoli. Cauliflowers varied, but were on the whole less resistant than Broccoli. Siberian kale was found resistant, but curly kale very susceptible and cottager's kale and coleworts intermediate. Kohlrabi was very susceptible. With all, even the most susceptible, as in the American varieties, there occurred individuals very resistant to the attack of the fungus, and this fact has led to the hope that strains immune from attack may be raised.—*F. J. C.*

Capsid Bug, The Common Green. By F. R. Petherbridge (*Jour. Min. Agr.*, vol. xxxv. No. 12, March 1929, pp. 1133–1140, 7 figs.).—*Lygus pabulinus* has become in recent years a serious pest of fruit trees and herbaceous plants, and the problem of its control has called for a serious attempt to be made to ascertain its life history and habits.

The species is indigenous to Britain, where it is found on hedge plants, herbaceous plants, and weeds.

The life history is shortly described. Eggs are laid in autumn in woody plants and in spring the bugs migrate to herbaceous plants, on which they deposit their summer eggs. The second generation returns to the woody hosts in autumn to lay their winter eggs.

Characters whereby this bug may be distinguished from the apple capsid, *Plesiocorus rugicollis*, are given.

Symptoms of damage to currants, gooseberry, apple, pear, plum, strawberry, raspberry, potato, beans, rose, hedge plants, herbaceous plants, and weeds are described.

Remedial measures include: (i) spraying the primary hosts and the ground around them as soon as all the bugs hatch with Nicotine-Soap wash applied under high pressure, (ii) destruction of weeds in fruit plantations to eliminate secondary host plants, (iii) the use of a trap crop, such as potatos, cutting off and burning the foliage as soon as the young bugs of the second generation are found, and (iv) shaking the bugs off on to sacking or sticky trays.—*G. F. W.*

Carrots, Self-fertile Strains (Einige versuche mit Züchtung von Mohrrüben durch Selbstbefruchtung). By J. Rasmusson (*Medd. No.* 18 *f. Alnarps Tradg. Forsoksv.*, 1926).—Umbels were isolated in parchment bags and seed was frequently obtained, minute insects being excluded. Homogeneous commercial stocks were taken for experiment. The "set" was dependent to a large extent upon weather conditions. Wild carrots were found self-sterile in a high degree, and no evidence was found to corroborate the statements that carrots of the domesticated type can be raised in a few generations from the wild without crossing.

Self-fertilized carrots usually produced smaller roots than open pollinated. The semi-long cylindrical type appears to be dominant over the conical and pointed type.—*F. J. C.*

Catasetum tenebrosum Kränzl. By O. Stapf (*Bot. Mag.*, t. 9086; Jan. 1926).—A plant with spikes of fairly large brownish- or reddish-black flowers with honey-coloured lips. It is a native of Peru.—*F. J. C.*

Cestrum psittacinum Stapf (*Bot. Mag.*, t. 9158; Oct. 1928).—In cultivation at Kew for thirty years, this is now named. It is a climber, native of Mexico, with bright orange and green flowers, requiring a temperate house; flowering in autumn.—*F. J. C.*

Cherry Pollination (Zelfsterilliteit en Kruisbestuiving van eenige kersensoorten in Zeeland. II). By A. M. Sprenger and A. K. Zweede (*Tids. Neder. Genootschap v. Landbouwwetenschap*, No. 7; Dec. 1928).—The varieties of Cherry 'Hangblad,' 'Bruine Blanche,' 'Zwarte Blanche,' 'Klerk,' 'Zoete Morel,' 'Markies,' 'Hollander,' 'Early Rivers,' 'Zwarte Spaansche,' and 'Suikerkers' were found to be self-sterile, and probably also 'Trosjeskriek.' 'Enkele Eierkriek' and 'Dubbele Eierkriek' were slightly self-fertile.—*F. J. C.*

Cirrhopetalum miniatum Rolfe. By O. Stapf (*Bot. Mag.*, t. 9109; Sept. 1926).—A small-flowered species with long red segments, native of Annam and Upper Laos, requiring stove temperature.—*F. J. C.*

Clerodendron Colebrookianum Walp. By O. Stapf (*Bot. Mag.*, t. 9082; Jan. 1926).—A temperate house shrub or small tree from Sikkim to Lower Burma. Flowers in corymbs, white, fruit at first green, then turquoise, finally bluish-black.—*F. J. C.*

Club-root in Relation to Soil Alkalinity. By C. Chupp (*Phytopathology*, vol. xviii. pp. 301–306).—The author endeavoured to find the *p*H value at which the club-root organism, *Plasmodiophora Brassicae*, was capable of attacking cruciferous plants and bringing about club-root. He found that at *p*H 7·2 to *p*H 7·4 the upper limit had been reached, but that the amount of infection rapidly increased with increased acidity, so that at *p*H 6·0 there was apparently no hindrance to infection. Sulphur gave no immunity, but proved injurious to the plants.—*F. J. C.*

Cordyline indivisa Stead. By O. Stapf (*Bot. Mag.*, t. 9096; June 1926).—A fine species from New Zealand, with red-veined leaves. A greenhouse plant in most parts of the country introduced about seventy years ago.—*F. J. C.*

Cotoneaster ambigua Rehder et Wils. By O. Stapf (*Bot. Mag.*, t. 9106; Sept. 1926).—A black-fruited species, deciduous, about 9 feet high, from Western China. It is nearly related to *C. acutifolia* (which has larger flowers and pyriform, not globose, fruits) and *C. foveolata*, which has larger almost glabrous foliage and flowers much like those of *C. acutifolia*.—*F. J. C.*

Cypripedium manchuricum virescens Stapf (*Bot. Mag.*, t. 9119; Aug. 1926).—Collected to the north of Vladivostock, this has been identified as an albino variety of *C. ventricosum* and of *C. macranthon*. It is now considered sufficiently distinct to be regarded as a variety of a new species *C. manchuricum*. The flowers are said to vary from red or rose or greenish to white; it has grown well in Dr. Keller's garden in Switzerland.—*F. J. C.*

Dendrobium Victoria-Reginae Loher. By O. Stapf (*Bot. Mag.*, t. 9071; Sept. 1925).—A blue-violet species from mountains in the Philippines. The lower parts of petals and sepals are white and the lip is entire not lobed, as the figure suggests. An Odontoglossum house species.—*F. J. C.*

Diervillea venusta Stapf (*Bot. Mag.*, t. 9080; Sept. 1925).—A Korean species differing in the form of the flower from *D. florida*; hardy.—*F. J. C.*

Diplomeris hirsuta Lindl. By O. Stapf (*Bot. Mag.*, t. 9113; Sept. 1926).—Called also *Diplochilus hirsuta* by Lindley in *Bot. Reg.*, sub t. 1499.—An Indian Orchid from Darjeeling requiring an intermediate house, and bearing greenish-white flowers about ½ inch in diameter.—*F. J. C.*

Disinfection, Study on. By P. Marchal and P. Vayssière (*Annales des Epiphytes*, *t.* xi. fasc. 3, 1925, pp. 121-183, 14 figs., 10 plates).—An extremely valuable summary of our present knowledge of plant disinfection has been collected by the authors.

The paper is divided into three parts, viz.: I. Methods of Disinfection; II. Agricultural Disinfecting Stations; and III. The Disinfection of Mills.

The first part deals with dosage, period of fumigation, method of application and the necessary conditions to ensure efficiency. The various substances used for fumigation are hydrocyanic acid gas, carbon bisulphide, and carbon tetrachloride, chloropicrin, formaldehyde, and various volatile solids. The use of hot air, hot water, immersion in various chemical solutions, low temperatures and vacuum conditions are mentioned.

The second part describes some of the types of disinfecting stations in Algiers, America, India, and S. Africa.

The last part deals with the disinfection of mills with hydrocyanic acid gas and hot air.

The figures and plates show the various types of machinery used in the disinfection of plants and plant products. The paper concludes with a bibliography of eighty-three papers.—*G. F. W.*

Flea-Beetles attacking Cultivated Cruciferae, The Biology of. By H. C. F. Newton (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp. 90–115, 3 plates).—A complete investigation into the species of *Phyllotreta* responsible for damage to cruciferous plants in gardens and fields has been carried out in mid-Kent.

The results of counts made in large gardens, cottage gardens, and the field are given.

Eight species of *Phyllotreta* are described, together with information regarding previous literature, present observations, and host plants.

Technical descriptions are given of the egg, larval, and pupal stages, whilst the larval characters are figured.

Further information is given concerning the nature and extent of injury, host plant preferences and attacks outside the Cruciferae.—*G. F. W.*

Flea-Beetles of the Genus Phyllotreta injurious to Cultivated Crucifer Crops, Experiments on the Control of. By H. C. F. Newton (*Jour. S.E. Agr. Coll., Wye*, No. 25, July 1928, pp 116–140).—The yearly damage by flea beetles of the genus *Phyllotreta*, better known as " fly " or " turnip fly," to various species of cultivated Cruciferae, has called for an investigation into the methods to be adopted against them on farm and garden crops.

A review of the previous work in controlling these pests is given.

The most destructive species are *P. atra* Payk., *P. cruciferae* Weise, *P. diademata* Foudr., and *P. undulata* Kutsch. The species that are most numerous in gardens are *P. consobrina* Curt. and *P. nigripes* F. The habits and life history of the several species are described in detail.

A series of spraying and dusting experiments were carried out using (i) deterrents and stomach poisons, and (ii) contact washes.

The possibility of an early underground attack must not be overlooked, for a great amount of damage is done by the beetles feeding on the fleshy hypocotyl, access being gained through cracks in the surface soil caused by the upward push of the young plants.

Successful control depends entirely on prompt action being taken so soon as the attack occurs. Deterrents were found to be more effective than contact or stomach poisons, and nicotine sulphate used either as a spray or a dust gave the best deterrent action.

The use of flea-beetle traps is recommended provided the soil is in fine tilth and the operation is conscientiously worked.—*G. F. W.*

Fraxinus Paxiana Lingelsh. By O. Stapf (*Bot. Mag.*, t. 9024; Dec. 1924).—From the Himalaya to W. China whence it was introduced by Wilson. A slow-growing tree with large panicles of creamy-white flowers. Allied to *F. Ornus*.
F. J. C.

Fritillaria libanotica Baker. By O. Stapf (*Bot. Mag.*, t. 9108 ; Sept. 1926).—The differences between this and *F. persica* (*Bot. Mag.*, t. 1537) are pointed out. The inflorescence is a raceme of about twelve to twenty-five flowers ; the flowers are nodding and campanulate, in shades of rose and purple with green outer segments. It is a native of Palestine and S. Syria.—*F. J. C.*

Geranium Farreri Stapf (*Bot. Mag.*, t. 9092 ; Jan. 1926).—A dwarf tufted perennial alpine species from the Min Shan, Western China, where Farrer collected it and whence he introduced it. It has large pale pinkish-lilac flowers. The figure shows the stem much too long drawn out.—*F. J. C.*

Guevina Avellana Molina. By O. Stapf (*Bot. Mag.*, t. 9161 ; Oct. 1928).—Native of Valdivia, Chiloe, and other parts of Southern Chile, this has proved hardy in the milder parts of the British Isles. It is an evergreen shrub or tree with dark, glossy, leathery pinnate or bipinnate leaves and axillary racemes of small white, greenish, or rosy flowers, followed by crimson to black globular fruits with large edible seeds.—*F. J. C.*

Habranthus robustus Herb. ex Sweet. By O. Stapf (*Bot. Mag.* t. 9126 ; Aug. 1927).—Synonyms quoted are *Amaryllis robusta*, *Hippeastrum tubispathum*, *Zephyranthes robusta*, and *Z. brachyandra*. It is a species with narrow leaves, and one flowered scapes produced before the leaves ; flowers pale pink with a green throat ; about 4 inches long and nearly as wide. It needs greenhouse protection. First introduced in 1827 and already figured by Loddiges and by Sweet.
F. J. C.

Hoffmannia Roezlii Hort. By O. Stapf (*Bot. Mag.*, t. 9025 ; Dec. 1924).—A Mexican perennial herb with very beautiful dark green and purplish leaves in rosettes and dark red flowers. It requires a stove temperature and shade.
F. J. C.

Hypericum Leschenaultii Choisy. By O. Stapf (*Bot. Mag.*, t. 9160 ; Oct. 1928).—*H. Leschenaultii* is allied to *H. patulum* and has appeared under many aliases. It is a native of the mountains of Java, and the figure shows flowers as large as but rather browner than those of *H. patulum Forrestii*. It is distinguished from *H. patulum* and *H. Hookerianum* by the herbaceous spreading calyx with acute or acuminate, often unequal, sepals and the rather large and usually long tapering capsules. Said to be hardy in Ireland.—*F. J. C.*

Itea ilicifolia Oliv. By O. Stapf (*Bot. Mag.*, t. 9090 ; Jan. 1926).—A shrub of 8 or 9 feet, densely clothed with evergreen spiny leaves about the size of common holly. Flowers small, green, in long racemes. Native of Central China. Hardy in some parts of England.—*F. J. C.*

Magnolia Sprengeri diva Stapf (*Bot. Mag.*, t. 9116 ; Aug. 1926).—A form collected by Mr. E. H. Wilson in W. China and distributed by Messrs. Veitch as *Magnolia denudata* var. *purpurascens*. The name *M. Sprengeri* was given by Campanini, and Stapf called the plant *M. diva* in Millais's " Magnolias." It is difficult to understand whether the author intends the name given at the head of the description to designate a variety or to stand for a species. *M. Sprengeri* is nearly related to *M. Campbelli*. It is deciduous, flowering before the leaves, with large flowers up to 8 inches across, rose carmine within, white and streaked carmine without.—*F. J. C.*

Malvastrum × hypomadarum Sprague. By O. Stapf (*Bot. Mag.*, t. 9087; Jan. 1926).—This is assumed to be a hybrid and the parents are said perhaps to be *M. capense* and *M. scabrosum*. It is a cool greenhouse plant of shrubby habit, propagated by cuttings, bearing white flowers about 1¼ inch across, with bright red markings.—*F. J. C.*

Muscari armeniacum Baker. By O. Stapf (*Bot. Mag.*, t. 9157; Oct. 1928).—The well-known Muscari 'Heavenly Blue,' hitherto regarded as *M. conicum* in all recent botanical and horticultural literature, is identified with *M. armeniacum* of Baker and is regarded as nearly related to *M. Szovitsianum* (*Bot. Mag.*, t. 6855). It is native of mountains of N.E. Asia Minor.—*F. J. C.*

Omphalodes Lojkae Somm. et Lev. By O. Stapf (*Bot. Mag.*, t. 9077; Sept. 1925).—Usually known in gardens as *O. cappadocica*, *O. cornifolia*, and *O. Wittmanniana*, this Caucasian plant is now identified with *O. Lojkae*, as an alpine (not woodland) type with leaves smaller than *O. cappadocica* and not typically cordate. It has loose cymes of deep blue flowers, with white central lines on the petals. Hardy and suited to the rock garden.—*F. J. C.*

Onion, Purple blotch (Macrosporium porri *Ell.*). By H. R. Angell (*Jour. Agr. Res.*, vol. 38, No. 9, May 1929; figs.).—Purple blotches are produced on leaves and stalks and on onion sets by the attack of the fungus, *Macrosporium porri*. This fungus is shown to be identical with *M. solani*, and its morphology, pathogenity, and physiology are dealt with. No experiments have been made in controlling it, and it is regarded as usually of but minor importance.—*F. J. C.*

Ozothamnus Antennaria Hook. f. By O. Stapf (*Bot. Mag.*, t. 9152; Oct. 1928).—Called in Bean's "Trees and Shrubs" *Helichrysum Antennarium*. A narrow-leaved shrub up to a yard high with corymbs of white flowers. Native of Tasmania, it requires a hot, sunny, sheltered position.—*F. J. C.*

Papaver commutatum Fisch. et Meyer. By O. Stapf (*Bot. Mag.*, t. 9091; Jan. 1926).—A Caucasian species, where it grows like the common poppy. It has been long known in gardens as *P. umbrosum* and is a most brilliant hardy annual species.—*F. J. C.*

Paphiopedilum Robinsonii Ridley. By O. Stapf (*Bot. Mag.*, t. 9155; Oct. 1928).—A Malayan species of very restricted distribution, with greenish flowers tinged purple in all parts.—*F. J. C.*

Pear, 'Kieffer,' Seedlings and Resistance to Fire-blight. By H. E. Thomas (*Bull. Torrey Bot. Club*, vol. liv. pp. 583–585; Oct. 1927).—Many seedlings of the hybrid Kieffer pear (*Pyrus serotina* × *P. communis*) were raised from open pollinated seed and 774 were planted out. These were inoculated with the fire-blight organism, *Erwinia amylovora*, and in 1924, 177 trees became infected, and by 1926, 368 more. The remainder had not shown signs of infection, but some probably would, since the attack varied with growth, the trees under better conditions proving more susceptible. An attempt to relate infection to external characters gave no distinct line of demarcation, but on the other hand characters peculiar to the more susceptible grandparent (probably Bartlett pear) were often associated with immunity in the seedling. The author thinks it probable, therefore, that the better type of pear may yet be obtained showing a marked degree of resistance to fire-blight.—*F. J. C.*

Pear, 'Williams' Bon Chrétien,' Storage Behaviour and Keeping Qualities from Different Localities in S. Africa. By W. A. Putterill (*Dep. Agr. S. Afr. Sci. Bull.* 70, 120 pp.; 1928).—The results of a long series of experiments and observations upon the quality and keeping powers of 'Williams' Bon Chrétien' Pears from different parts of the Union are detailed. A relatively low moisture content, a high total nitrogen content, and a high percentage of total soluble solids other than sugars and acid in the juice are regarded as typical of pears of the best keeping qualities.

In most instances storage at 34° F. resulted in the development of unpleasant musky flavour. Visible scald appeared after four weeks' storage at 45° F. and after nine or ten weeks at 34° F., but considerable differences were found in susceptibility to scald in pears from different localities. Scald appeared earlier in late than in early pickings from any one locality. Waxed paper did not, as a rule, exercise any beneficial effect upon keeping qualities.

In almost every test the later pickings were of better quality than the earlier in storage, and cultural details are thought to exercise more influence upon the keeping qualities than do fluctuations of temperatures during growth.—*F. J. C.*

Peas, Standard Description of Vegetables. By T. F. Richie (*Dep. Agr., Canada, Bull.* 107, N.S.; 1928; plates).—The varieties of peas admitted into Canadian seed lists are described with their synonyms and photographic illustrations of haulm, pods, and peas ripe and unripe. A very useful publication though dealing with a limited range of varieties.—*F. J. C.*

Potato, Cut Seed, Preliminary Test of Stored. By K. C. Westover (*Rep. Amer. Soc. Hort. Sci.*, 1928, pp. 85–87).—Tubers were cut at weekly intervals from mid-October to the end of April and stored until planting time at 38°–42° F. The first two only then showed marked discoloration and shrivelling.

The results in general indicate that the greater the length of time between cutting and planting the greater the reduction in yield. This bears out experiments made in this country.—*F. J. C.*

Potato, Does Shape of Seed Influence Yield? By K. C. Westover (*Rep. Amer. Soc. Hort. Sci.*, 1927, pp. 46–50).—Experiments are detailed, but results are inconclusive.—*F. J. C.*

Potato, Effect of Sprout Removal on Yield. By K. C. Westover (*Rep. Amer. Soc. Hort. Sci.*, 1928, pp. 53–57).—The results indicate that the removal of sprouts reduces the yield; that one removal has little effect, but more, greater.—*F.J.C.*

Potato, Infection by Alternaria Solani and Storage. By L. O. Gratz and R. Bonde (*U.S. Exp. Sta., Florida, Bull.* 187; June 1927).—*Alternaria Solani* produces dark sunken areas on the tubers, sometimes surrounded by purplish raised borders. They may be shallow or deep. They are distinguished from damage caused by Phytophthora by being dark brown, whereas the latter are water-soaked and reddish-brown. The fungus causes "early blight" of the foliage of potatos, and tubers are readily infected by contact with the diseased foliage. *F. J. C.*

Potato Virus on Peppers. By F. M. Blodgett (*Phytopathology*, vol. xvii. pp. 775–782; Nov. 1927; figs.).—A virus disease producing mottling of pepper foliage quickly becoming necrotic and causing leaves to fall was found to be transmissible from potatos to peppers by inoculation. The virus is not transmitted through seed either of peppers or potatos, but is transmitted by potato tubers.—*F. J. C.*

Primula Bulleyana Forr. By O. Stapf (*Bot. Mag.*, t. 9026; Dec. 1924).—Discovered and introduced by Mr. G. Forrest for Mr. Bulley. A hardy species for moist places with tiers of orange flowers.—*F. J. C.*

Primula effusa W. W. Sm. et Forr. By O. Stapf (*Bot. Mag.*, t. 9121; Aug 1926).—Discovered by Handel-Mazzetti and by Forrest in 1914 in the Yangtse gorges. Best grown in the greenhouse as an annual; related to *P. malacoides*. *F. J. C.*

Primula Inayatii Duthie. By O. Stapf (*Bot. Mag.*, t. 9107; Sept. 1926).—From mountains of Hazara, Kangan, and other places in the Western Himalaya at an elevation of about 4,000–5,400 feet. The author considers this nearly related to *P. erosa.* It flowers early and has blue-purple to lilac flowers about ½ inch across.—*F. J. C.*

Red Spider Mite, The. By E. R. Speyer (*Jour. Min. Agr.*, vol. xxxvi, No. 1, April 1928, pp. 58–64, 3 figs.).—*Tetranychus telarius* is a well-known pest of many glasshouse plants, whilst its attention in the open is confined to such economic crops as hops, strawberry, violets, and red clover. Weeds such as dead-nettle, stinging nettle, bindweed, and dock occasionally provide breeding grounds for the pest.

The life history of the mite under glasshouse conditions is described in detail.

Control measures are arranged in three groups, viz.: (i) fumigants; (ii) sprays; and (iii) winter treatment of infested houses.

Naphthalene 'Grade 16' provides the most satisfactory fumigant for use in commercial houses. The temperature should be above 74° F. and the air charged with water vapour. The minimum dosage is 3 lb. naphthalene to every 100 ft. run of border (6 lb. to 100 ft. house). As the fruit of cucumber readily absorbs the odour, the crop should be cut prior to fumigation or should be well aired before marketing. Naphthalene fumigation is not satisfactory for tomatos and carnations on account of the prolonged period during which the plants are subjected to the required conditions of temperature and humidity. Sulphur vapour is toxic to the mite, but great care must be exercised in its use.

Highly refined petroleum emulsions used at the rate of 1 part to 80–100 parts of water give good control. As all the eggs are not killed by one application, spraying must be repeated seven to fourteen days after the first application. Mealy-foliaged plants, e.g. carnations, must never be sprayed with these emulsions. Provided soft water is used, liver of sulphur (½ per cent.) with the addition of soft soap (½ per cent.) is very effective against red spider on tomatos and carnations. The method of preparing a standard solution is described.

Winter treatment consists of either heavily broadcasting naphthalene over the whole soil surface prior to the removal of the plants or, in the case of large-span houses, the material may be volatilized from special lamps. An alternative method is to spray the plants, glass, and woodwork at the end of the growing season with cresylic acid emulsion. The over-wintering mites may be trapped by laying down dry straw or corrugated paper during September between the plants and on the hot-water pipes.—*G. F. W.*

Rhazya orientalis DC. By O. Stapf (*Bot. Mag.*, t. 9119; Aug. 1926).—A herbaceous perennial or undershrub from Asia Minor, not quite hardy in Great Britain. It bears an umbel of blue to mauve flowers, each about two-thirds of an inch across.—*F. J. C.*

Rhododendron anthosphaerum Diels. By O. Stapf (*Bot. Mag.*, t. 9083; Jan. 1926).—This is in part the *R. hylothreptum* of Balfour and W. W. Smith; it was introduced by Forrest from N.W. Yunnan, where it grows to 20 or 30 feet. Flowers large crimson-rose, flowering in England at the end of March.—*F. J. C.*

Rhododendron hippophaeoides Balf. f. et W. W. Sm. By O. Stapf (*Bot. Mag.*, t. 9156; Oct. 1928).—Native of N.W. Yunnan, discovered by Ward and introduced by Forrest in 1913. A dwarf evergreen with clear lavender-blue, purple, or rose-pink flowers in crowded eight-flowered umbels, requiring sandy peat. The height is stated to be 1–5 m., but that is evidently a misprint for feet.—*F. J. C.*

Rhododendron megeratum Balf. f. et Forr. By O. Stapf (*Bot. Mag.*, t. 9120; Aug. 1926).—A shrub about 18 inches high with 1½ inch dark-green leaves, grey beneath, and yellow flowers bell-shaped and about an inch across. Found by Mr. George Forrest on the Yunnan-Tibet frontier.—*F. J. C.*

Rhododendron saluenense Fr. By O. Stapf (*Bot. Mag.*, t. 9095; June 1926).—A dwarf species with branches covered with rufous bristles and scaly; small dark green leaves, yellowish below with imbricate scales varying in colour; flowers rose-purple with darker spots in small terminal umbels (usually two- to three-flowered), corollas about 1¼–1¾ inch in diameter. Native of N.W. Yunnan, hardy, introduced by Forrest's seeds. The author reduces *R. chameunum* Balf. f. et Forr., *R. humicola* Wilding, *R. sericocalyx* Wilding, and *R. colobodes*, as synonyms of *R. saluenense*.—*F. J. C.*

Rhododendron trichocladum Fr. By O. Stapf (*Bot. Mag.*, t. 9073; Sept. 1925).—A deciduous species with greenish-yellow flowers about 2 inches across and hairy brown stems about 3 feet high. Native of the mountains above Tali, West Yunnan, at 8,000 to 9,000 feet altitude.—*F. J. C.*

Rhodospatha Forgeti R. E. Brown. By O. Stapf (*Bot. Mag.*, t. 9105; Sept. 1926).—A climbing aroid from Costa Rica requiring stove temperature. The spathes are at first white without and rose within, quickly turning a dirty shade.
F. J. C.

Rooting Capacity, Review of Publications on Anatomical Structure in Relation to (Overzicht over eenige onde en nieuwe publicaties betreffende de anatomische structuur in verband met het bewortelingsvermogen). By Dr. H. A. A. van der Lek (*Tids. Neder. Genootschap v. Landbouwwetenschap*, No. 6; Oct. 1928).—Reviews various papers on root initials in relation to the striking of cuttings, and on burr-knots. The frequent American view that burr-knots are due to attacks of *Bacterium tumefaciens* appears to find little support in these papers.—*F. J. C.*

Rooting of Woody Cuttings (Over de Wortelvorming van houtige steken). By H. A. A. van der Lek (*Meded. v. de Landbouwhoogesch. t. Wageningen*, 1, 1927).—The rooting of woody cuttings was studied in black currant (*Ribes nigrum*), willows (*Salix amygdalina, S. pulchra, S. alba vitellina britzensis, S. nigricans, S. rotundifolia, S. laurifolia, S. discolor, S. regalis, S. babylonica, S. Caprea*, and *S. aurita*), poplars (*Populus nigra pyramidalis, P. trichocarpa,* *P. Simoni*, *P. theresiina*, and *P. alba*), and in vines. In all but *Salix Caprea*, *S. aurita*, *Populus alba*, and vines root germs were found previous to the making of the cuttings.

The position of the developing roots is determined even in those roots where no root-rudiments were present, by the structure of the stem, and there seems to be preparation, as it were, for the development of roots even in these.

Environment determines the places where most roots develop, but there is connexion between the position and development of buds and the development of roots and even callus, and in some instances the removal of the bud exercised an inhibiting influence upon the formation of callus.

The idea that roots originate in wound callus as a rule is shown to be erroneous, although in some plants this is probably true, e.g. *Sambucus nigra*, but they usually originate in the structures immediately above it.

Review of literature is given, and various hypotheses regarding the nature of roots are alluded to.—*F. J. C.*

Rosa mirifica Greene. By O. Stapf (*Bot. Mag.*, t. 9070; Sept. 1925).—Native of the mountains near Sacramento, California, a shrub with glabrous shoots, small leaflets, and clear deep-rose flowers paling with age. Hardy. *F. J. C.*

Roscoea cautleoides Gagnep. By O. Stapf (*Bot. Mag.*, t. 9084; Jan. 1926).—Introduced by Forrest from above Tali, this is a canary-yellow species, flowering usually in summer in England. It seems to prefer lime, leaf soil, and sand, and is hardy. Purple-flowering forms occur in its native home.—*F. J. C.*

Roscoea Humeana Balf. f. et W. W. Sm. By O. Stapf (*Bot. Mag.*, t. 9075; Sept. 1925).—Introduced from Yunnan by G. Forrest in 1912. A purple-flowering species with flowers produced before the leaves fully expand. The spike is two- to eight-flowered. Probably hardy in rich, moist soil.—*F. J. C.*

Salix Bockii Seem. By O. Stapf (*Bot. Mag.*, t. 9079; Sept. 1925).—A small-leaved Willow from Western Szechwan, where it grows in sandy and shingly foreshores. It forms an erect shrub up to 9 feet in height and is peculiar in producing its catkins on the current year's shoots.—*F. J. C.*

Salix gracilistyla Meg. By O. Stapf (*Bot. Mag.*, t. 9122; Aug. 1926).—Native of Japan and perfectly hardy; with yellowish green foliage and handsome catkins, pink with developing stamens before the leaves. It makes a dense shrub about 8 feet in height.—*F. J. C.*

Sargentodoxa cuneata Rehder et Wils. By O. Stapf (*Bot. Mag.*, t. 9111 et 9112; Sept. 1926).—The only member of a new family of hardy climbing habit, with trifoliolate leaves, racemes of green flowers and bunches of globose black berries. Introduced from Central China.—*F. J. C.*

Saxifraga × amabilis Stapf (*Bot. Mag.*, t. 9139; Oct. 1928).—This Kabschia Saxifrage is regarded as probably a hybrid between *S. Sempervivum* and *S. Stribrnyi*. It has carmine flowers.—*F. J. C.*

Scabiosa anthemifolia Eck. et Zeyh. (*Bot. Mag.*, t. 9115; Sept. 1926).—Native of the coastal region of the Cape, introduced by Mr. Thos. Hay, this behaves as a biennial and is rather tender. It may be grown, however, as an annual. The flowers are mostly rose or slightly mauve. It is nearly allied to *S. Columbaria* of Europe.—*F. J. C.*

Seed Disinfectants, their Influence on Germination (Een onderzoek naar den invloed van eenige ontsmettingsmiddelen op de kiemkrachts van Tomaten en Selderijzaad). By H. R. A. Muller (*Lab. v. tuenbouwpl.* 2; March 1925).—Damage to germination of tomato seed resulted from treatment with Uspulun more markedly than with Germisan (grain seeds showed the reverse). Treatment for one hour both in tomatos and celery gave better germination than treatment for half an hour. Celery 'Venlo' was uninjured and indeed stimulated by treatment with both Uspulun and Germisan; all other varieties were injured. Formalin also caused some injury.—*F. J. C.*

Solanum laciniatum Ait. By O. Stapf (*Bot. Mag.*, t. 9154; Oct. 1928).—*S. replicatum*, *S. vescum*, *S. aviculare*, and *S. aviculare vescum* are quoted as synonyms of this Australian sp., *S. aviculare* Forster being retained for the New Zealand species. It is a greenhouse plant with large foliage and handsome deep violet flowers.—*F. J. C.*

Spartina Townsendii H. and J. Grove. By O. Stapf (*Bot. Mag.*, t. 9125; Aug. 1927).—An interesting hybrid grass of importance in reclaiming shallow sea marshes, but of no horticultural value.—*F. J. C.*

Spiranthes Parnii Braid. By O. Stapf (*Bot. Mag.*, t. 9094; June 1926).—A terrestrial species from the Argentine, where it flowers in autumn and early winter. Under stove treatment it has flowered at Kew from January to March. The numerous greenish flowers with white lips are produced in spikes of about 5 inches.—*F. J. C.*

Staphylea holocarpa Hemsley. By O. Stapf (*Bot. Mag.*, t. 9074; Sept. 1925).—Found in Central China by various explorers and introduced by Wilson from Hupeh in 1908, this is a common deciduous woodland shrub or tree, in its native home reaching to 30 feet in height. It has trifoliolate leaves, developing soon after the many-flowered panicles of small rose (fading to white) flowers. Apparently variable in its flowering habits from year to year.—*F. J. C.*

Stellera Chamaejasme Linn. By O. Stapf (*Bot. Mag.*, t. 9028; Dec. 1924).—A glabrous small shrub with erect annual shoots about 15 inches high terminated by umbels of white or faintly pinkish sweet-scented flowers not unlike those of *Daphne Cneorum*. Introduced by Mr. Farrer from W. China. *F. J. C.*

Strawberry Roots, Killing. By H. E. Thomas (*Phytopathology*, vol. xviii. p. 928).—The characteristics of the trouble investigated are the death of roots from below upwards, the breaking down of the crown and frequently subsequent death. All varieties grown in New York State were affected. No fungus could be definitely associated with the trouble. It is therefore concluded that fungi play a minor rôle in bringing about the death of strawberry roots and that the cause is to be sought in soil and other environmental conditions.—*F. J. C.*

Sweet Potatos, Further Notes on Flowers and Seeds. By A. B. Stout (*Jour. N.Y. Bot. Gard.*, 27, pp. 129–135; 1926; figs.).—The type of self and cross sterility in sweet potatos is considered and evidence brought forward from different districts.—*F. J. C.*

Trillium Rust. By M. F. Barrus (*Mycologia*, vol. xx. pp. 117–126; June 1928; figs.).—The aecidial stage of a fungus has been found over a very restricted area near Ithaca on Trilliums. It has been called *Aecidium Trillii*, and it is now related by experimental inoculation to a *Uromyces* (*U. Halstedii*) on the grass *Brachyelytrum erectum*. The same Uromyces has been found in other districts attacking *Leersia virginica* and *L. oryzoides*. The uredospores appear to be incapable of surviving the winter, and the fungus therefore depends upon the coexistence of the two hosts. Both the fungus *Darluca filum* and gall midge larvæ have been found attacking the rust.—*F. J. C.*

Tulipa australis var. **arvorum** Stapf (*Bot. Mag.*, t. 9078; Sept. 1925).—Collected by the Marquis of Headfort between Batna and Biskra in 1923. A rather small tulip with yellow interior to the perianth, exterior tinged purplish-red.—*F. J. C.*

Tulipa lanata E. Regel. By O. Stapf (*Bot. Mag.*, t. 9151; Oct. 1928).—A native of Bokhara with densely woolly bulb tunics, four wide unspotted leaves, and large scarlet flowers with (frequently) a yellow-bordered black blotch at the base within. The tulips *T. ingens*, *T. Tubergeniana*, *T. Fosteriana*, and *T. Hoogiana* are all regarded as garden forms of this species.—*F. J. C.*

Turnip Mud Beetle, The (*Helephorus rugosus* Ol. and *H. porculus* Bedel). By F. R. Petherbridge (*Ann. App. Biol.*, vol. xv. No. 4, Nov. 1928, pp. 659–678, 8 figs., 1 plate).—Because much damage was done to white turnips in the east of England during the past few years by two species of *Helephorus*, commonly known as turnip mud beetles, investigations into the life histories of both species were commenced in 1921. A brief review of reported damage to crops since 1894 is given.

The larval, pupal and adult stages of *H. rugosus* and the larval and adult stages of *H. porculus* are described in detail.

These pests feed chiefly on plants belonging to the genus *Brassica*, great preference being shown for the common white turnip (*B. rapa*). Other host plants include swedes, rape, cabbage, thousand-headed kale, wallflower, lettuce, beans, shepherd's purse, and sainfoin.

The life histories of both species are similar in that the eggs are laid in August and the larvæ live from August until April and May, when pupation takes place. Adults are found from May until the following March.

Symptoms of attack on the various hosts are described.

Control measures include (i) early sowing—no case of a bad attack has been noted with turnips sown before July, and (ii) crop rotation—turnips and other susceptible plants should not be grown on land that has borne an infested crop the previous year. Seed beds of turnips and swedes raised for seed growing should be on land which has not grown a cruciferous crop for at least one year.

G. F. W.

Vines. Dead Arm Disease of Grapes in Ontario. Preliminary Report. By L. C. Coleman (*Sci. Agr.* 8, pp. 281–305; Jan. 1928; figs.).—This is the most serious disease of grapes in Ontario. The vine or its branches ultimately die, growth is stunted, and leaves are deformed or chlorotic; old pruning wounds show lesions due to fungus attack. The fungus concerned is *Cryptosporella viticola.* Internally lignin formation is checked and the production of conducting tissue is diminished, medullary ray and cortex are increased.

The measures suggested are to mark in June the stem or branches attacked and to remove them in the following pruning season; and to spray once or twice in May the pruning wounds so as to prevent the germination of spores emitted at that season.

All varieties are liable to attack, but Wilder, Delaware, Vergennes, and Niagara are markedly resistant at Vineland.—*F. J. C.*

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 3, 1928.

Sir WILLIAM LAWRENCE, Bt., in the Chair.

Sixty-three Fellows and one Associate were elected, and one Society affiliated.

GENERAL MEETING.

JANUARY 17, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair.

One hundred and thirty-nine Fellows and four Associates were elected, and three Societies affiliated.

A lecture on " Plants in our Gardens and how they came there " was given by the Hon. Lady Cecil (see vol. **53**, p. 299).

GENERAL MEETING.

JANUARY 31, 1928.

Sir WILLIAM LAWRENCE, Bt., in the Chair.

One hundred and sixty Fellows and four Associates were elected, and six Societies affiliated.

ONE HUNDRED AND TWENTY-FOURTH ANNUAL GENERAL MEETING

HELD ON FEBRUARY 14, 1928.

The Rt. Hon. The LORD LAMBOURNE, P.C., G.C.V.O., V.M.H. (President), in the Chair, supported by the members of Council and some two hundred Fellows.

The Secretary read the notice convening the Meeting.

The Minutes of the last Annual General Meeting, having been circulated, were taken as read.

Mr. Fife, expressing his dissatisfaction at the record of his motion regarding the Rose Trials, begged leave to ask the following questions :

(1) Whether the desperate efforts to retrieve the conditions of the Rose Trial at Wisley had met with any degree of success, and whether the Chairman considered the results obtained were value for the expenditure.

(2) Why did the appointed Rose judges find the plants in such a condition in 1927 that they did not feel justified in recommending any awards in a season which, the Report indicated, was favourable to the Wisley soil?

Mr. Nix replied as Chairman of the Wisley Committee during 1927 that he disagreed with the remarks of Mr. Fife and in reply to his questions the Rose Trial as conducted was considered of great value to the Society and to those who grow Roses.

The Minutes were then adopted and signed.

One hundred and sixty-three Fellows and three Associates were elected and twelve Societies affiliated.

The President, before moving the adoption of the Report, made the following presentations:

Victoria Medal of Honour.—To Mr. F. R. S. Balfour, who has taken an active part in forestry and arboriculture for many years past; Mr. J. G. Millais, for his work on rhododendrons and magnolias; Dr. O. Stapf, the Society's editor of the *Curtis's Botanical Magazine* and the *Index Londinensis*; Mr. Harry White, a well-known raiser of rhododendron species at his Sunningdale Nurseries (unable to be present); Mr. J. T. White, the pioneer of narcissus growing in the Spalding area; Mr. P. D. Williams, a great amateur gardener and breeder of daffodils (unable to be present).

Lawrence Medal.—To Mr. G. G. Whitelegg for his rock garden exhibit at the Chelsea Show in 1927.

Veitch Memorial Medals.—Gold Medal to Professor L. H. Bailey, for his scientific work on behalf of horticulture (unable to be present); Gold Medal to Mr. John Basham, for his general services in fruit cultivation; Gold Medal to Mr. Frederick J. Hanbury, for his work in the preservation and cultivation of the British flora and in raising orchids; Silver Medal and £50 to Mr. Frank Reader, on his retirement from the service of the Society (unable to be present).

The Cory Cup.—To Mr. W. B. Cranfield, for Paeonia 'Orion,' which was judged to be the best new hybrid plant of garden origin shown to the Society during 1927.

The Loder Rhododendron Cup.—To Mr. E. H. Wilson, the curator of the Arnold Arboretum, in recognition of his work in introducing and describing rhododendrons and azaleas (unable to be present).

The George Moore Medal.—To Messrs. Armstrong & Brown, for Cypripedium × 'Chardmoore' var. 'Mrs. Cowburn,' which was considered to be the best new Cypripedium shown to the Society during 1927 (unable to be present).

Sander Medal.—To Baron Bruno Schröder, for Miltonia × 'Wm. Pitt,' 'Dell Park' var., which was considered to be the best new greenhouse plant shown to the Society during 1927.

Williams Memorial Medals (two medals).—For the best groups of plants of one genus showing excellence in cultivation—Messrs. Blackmore & Langdon, for their exhibit of begonias at the Great Autumn Show, 1927; The Executors of the late Mr. G. F. Moore, for his exhibit of cypripediums on January 11, 1927.

During the presentations the President referred with sympathy to the absence of Mr. F. Reader, the late chief cashier of the Society, who had been awarded a Veitch Memorial Medal and £50. He said that he would like to convey the sympathy of this meeting to Mr. Reader, and Sir William Lawrence had kindly volunteered to take the Medal and cheque to him personally in the hospital.

The President then moved the adoption of the Report, saying that he thanked his colleagues on the Council for the extensive work they had carried out during the year and for their kind indulgence during the period of his illness. He referred to the progress of the new Hall and said that at the moment he was not able to announce the arrangements for the Opening Ceremony, but hoped that they would be made known to the Fellows shortly. He drew particular attention to the International Exhibition of Garden Design and Conference on Garden Planning, which was a new feature of the Society's activities.

The President then called upon Sir William Lawrence, the Treasurer, and Mr. Musgrave to support the resolution for the adoption of the Report.

Sir William Lawrence, in seconding the adoption of the report, emphasized the importance of the Society as a scientific institution. He described at length the work of the Society in its Gardens at Wisley, the scientific work in the laboratories dealing with troubles from pests, etc., and the value of the Gardens as an educational institution for training young gardeners, the importance of the trials of fruit, flowers, and vegetables that are being regularly carried out, and lastly the expeditions organized or supported by the Society for the purposes of gaining fresh information and introduction of plants likely to be of value in the gardens of this country.

Sir William Lawrence then referred to the finances of the Society and was pleased to report that, in spite of the very heavy commitments of the Society financially, the position was one that was entirely satisfactory.

He drew attention to the publications of the Society, mentioning in particular *Curtis's Botanical Magazine*, and the publication of the revision of the Pritzel Index, which would in future be called the *Index Londinensis*.

Mr. Musgrave, the Chairman of the Housing Committee, reported on the progress of the new Hall, which was now coming to a stage when completion was in view.

Lt.-Col. L. E. Fawcus drew attention to the question of overcrowding at the Chelsea and other Shows, and suggested that the privileges given to Fellows of introducing friends should be limited by the Council, and in so doing suggested one or more ways in which these privileges could be curtailed. The President replied that the proposed new Bye-laws would give the Council the powers that Colonel Fawcus suggested, and that the matter would receive the consideration of the Council after the new Bye-laws had come into force. Colonel Fawcus was asked to send his proposals in writing.

The Report was then adopted.

Mr. C. H. Curtis asked what the estimated cost of the new Hall was.

Sir William Lawrence replied that the cost up to the moment was estimated at between £168,000 and £170,000.

The following nominations had been circulated to all Fellows in accordance with Bye-law 74, and as the number of names proposed did not exceed the number of vacancies, the President declared all the nominees to be duly elected.

As President.	*Proposed by*	*Seconded by*
The Rt. Hon. The Lord Lambourne, P.C., G.C.V.O., V.M.H.	Sir William Lawrence, Bt.	Mr. C. G. A. Nix.
As Treasurer.		
Mr. C. T. Musgrave, V.M.H.	Sir William Lawrence, Bt.	Mr. G. W. E. Loder.
As Members of Council.		
Mr. E. A. Bowles, M.A., F.L.S., F.E.S., V.M.H.	Mr. C. T. Musgrave.	Sir William Lawrence, Bt.
Mr. William Cuthbertson, J.P., V.M.H.	Mr. G. W. E. Loder.	Mr. G. Monro.
Mr. J. B. Stevenson.	The Hon. H. D. McLaren.	Mr. R. D. Trotter.
As Vice-Presidents.		
The Duke of Bedford, K.G., F.R.S.	Mr. C. T. Musgrave.	Mr. C. G. A. Nix.
The Duke of Portland, K.G., P.C., G.C.V.O.		
The Viscount Ullswater, G.C.B.		
Sir James Knott, Bt.		
The Rt. Hon. Sir Herbert Maxwell, Bt., P.C., D.C.L., LL.D., F.R.S., V.M.H.		
Sir Daniel Morris, K.C.M.G., J.P., D.Sc., D.C.L., F.L.S., V.M.H.		
Lt.-Col. Sir David Prain, C.M.G., C.I.E., LL.D., F.R.S., F.L.S., V.M.H.		
The Hon. Vicary Gibbs, V.M.H.		
Mr. E. A. Bowles, M.A., F.L.S., F.E.S., V.M.H.		
Mr. J. C. Williams.		
As Secretary.		
Mr. F. R. Durham, C.B.E., M.C.	Mr. C. T. Musgrave.	Mr. C. G. A. Nix.
As Auditor.		
Mr. Alfred Harper.	Mr. C. G. A. Nix.	Mr. C. T. Musgrave.

The President called upon Mr. Musgrave, the Chairman of the Bye-laws Committee, to move a Resolution in respect to the new Charter and Bye-laws.

Mr. Musgrave explained at length the reasons for the necessity of applying for a new Charter, together with the revision of the Bye-laws, laying stress on the insufficiency of the powers of the Society under the existing Charters to hold land, owing to the growth of the Society, and on the desirability of making the post of Secretary that of a permanent official and not subject to an annual election.

Mr. Musgrave explained the proposed Bye-laws in detail, pointing out the most important changes, at the same time making it clear that there were other changes which he did not specifically mention dealing chiefly with verbal alterations or minor administrative matters. He referred in particular to the proposed new method for the election of Fellows, to Bye-laws dealing with the retirement, disqualification and removal of Fellows, to the adjustments of time with regard to the Annual Meeting, and to the constitution of the Council under which it was proposed that the Council should consist of the President and fifteen other Fellows of the Society, the President being a member *ex officio*. In this respect he drew attention to the necessity of the Meeting appointing an additional Member of Council to take office after the acceptance of the new Charter and Bye-laws, and he announced that Dr. A. W. Hill, Director of the Royal Botanic Gardens, Kew, had consented to be nominated for this position.

Mr. Musgrave then drew attention to the Bye-law providing for the retirement of the Members of Council after serving for a term of five years, the Bye-law dealing with the copyright powers of the Society, the staff pensions, and, finally, to the first Appendix setting out the subscriptions, entrance fees, the rights and privileges of the Fellows and the form of election. He informed the Meeting that the Council had been advised to add an additional Bye-law, which he read and explained. It was as follows :—

> "The accidental omission to give notice of any meeting to or the non-receipt of any such notice by any of the Fellows shall not invalidate any resolution passed at any such meeting."

Mr. Musgrave then begged leave to move that the Petition for the new Charter and the draft of such Charter with the Bye-laws thereto and as amended at this Meeting are hereby approved, and that the Council be authorized to proceed with the Petition to obtain such Charter and Bye-laws subject to such modifications (if any) as are required by His Majesty in Council.

Mr. A. H. Pearson seconded the motion, thanking Mr. Musgrave for his detailed explanation. The motion was unanimously carried, Mr. A. H. Munford supporting

Dr. Rodman proposed a hearty vote of thanks to the President for taking the Chair at this Meeting, which was seconded by the Rev. A. T. Boscawen. The vote of thanks was received with acclamation.

REPORT OF THE COUNCIL FOR THE YEAR 1927.

1. **The Year 1927.**—The prosperity of the Society has been maintained throughout the period under review and the number of Fellows and Associates has increased by over sixteen hundred.

2. **Obituary.**—During the past year the Society has lost many valued friends: Sir John T. D. Llewelyn, Bt., D.L., J.P., F.L.S., V.M.H., one of the Society's distinguished Vice-Presidents, who took an active interest in the work of the Society and who received the Victoria Medal of Honour in 1907; Dr. B. Daydon Jackson, F.L.S., who was a constant attendant at the Library Committee Meetings, and to whose interest and advice the Library owes so much; and Professor C. S. Sargent, F.L.S., of the Arnold Arboretum, an Honorary Fellow of the Society. Two other holders of the Victoria Medal of Honour have passed away during the year—Mr. G. F. Moore, who will always be remembered for his orchids and especially for his Cypripediums, for which flower he founded a special medal; and Mr. G. Mount, who was a renowned rose-grower. Among the many other friends of the Society should be mentioned the Earl of Iveagh, J. A. Nix, H. T. Pitt, a regular exhibitor of orchids, William Pope, and the Duchess of Wellington.

3. **The New Hall.**—The progress of the construction of the new Hall has been somewhat slower than was anticipated, the inclement weather conditions during the summer having hampered the construction. Nevertheless, in the past months the contractors have been making good progress. The date of the opening cannot yet be definitely announced, but due notice will be given as soon as this can be fixed, in order that Fellows and Associates may have an opportunity of attending the opening ceremony.

4. **Numerical Progress.**—

Loss by Death in 1927.	
Life Fellows	11
Honorary Fellows	3
4 Guineas	6
2 ,, ...	169
1 ,, ...	140
Associates	1
	330

Loss by Resignation, etc.	
4 Guineas	6
2 ,, ...	498
1 ,, ...	548
Affiliated Societies	41
Associates	43
	1,136
Total Loss	1,466

Fellows Elected in 1927.	
Life Fellows	14
4 Guineas	23
2 ,, ...	1,797
1 ,, ...	1,141
Affiliated Societies	75
Associates	88
	3,138
Deaths and Resignations ..	1,466
Numerical Increase ..	1,672
Total on November 16, 1926	23,332
Total on November 15, 1927	25,004

5. **The Fortnightly Meetings.**—During the year the Fortnightly Meetings of the Society were well attended and the displays were of high quality. The interest both of visitors and of exhibitors in the Shows steadily grows, as is shown by the demand for more space and accommodation, which the Council hopes the new Hall will give. The special table for small exhibits instituted for the first time in 1927 has been largely made use of and over a hundred exhibits have been displayed on it in the course of the year.

6. **The Daffodil Show.**—The Daffodil Show was the best that has ever been held. The exhibitors and visitors were more numerous than on previous occasions. A Conference took place and the Council has adopted its suggestion that in the schedule there should be classes in which the price-limit of the bulb should be fixed. It is hoped that daffodil lovers of smaller means will come forward and exhibit in these classes.

7. **The Chelsea Show.**—The arrangements for the Great Spring Show were improved by the renting of additional ground which allowed a better lay-out of the tents and more accommodation. The Show was attended by an unprecedented number of visitors. The private view on the first day gave special facilities to holders of Fellows' tickets. The Council has decided to reserve special hours for holders of Fellows' tickets both on the first and second days of the Show in 1928. Although complaints have been received from Fellows with regard to the overcrowding, it is to be remembered that the available ground is limited, and that the growth of the Society is continuous. The Show was in every way excellent and the quality of the exhibits of high standard. The Sherwood Cup for the best exhibit in the Show was awarded for the rock garden of Mr. G. G. Whitelegg.

8. **Primula Conference at the Chelsea Show.**—A Primula Conference will be held on Thursday, May 24, 1928, commencing at 11 A.M. At this Conference special exhibits of Primulas, species and garden forms, will be staged. Everyone interested in Primulas is invited to contribute plants for exhibition and to take part in the Conference.

9. **Commemoration Cup.**—The Society will offer at the Chelsea Show in 1928, to commemorate the opening of the new Hall, a special cup called "The Commemoration Cup," valued at one hundred guineas, and it will be for the best exhibit of stove and greenhouse plants on an area not exceeding 300 square feet. Amateur and trade growers of these plants are invited to compete for this Cup.

10. **The Amateurs' Show.**—The success of the third Amateurs' Show completely justified the Council's decision to maintain this feature on the Society's calendar. A larger number of exhibits was staged than was the case in previous years, and there were many new exhibitors. The schedule for this year is now being revised and will shortly be available. The Show will be on June 26 in 1928.

11. **The Fruit Competitions.**—The Fruit Competitions for Cherries, Gooseberries, Currants, Raspberries, etc., and for Peaches, Plums, Early Apples, etc., were held on July 19 and August 3, respectively. The Council has decided to repeat these two fruit competitions in 1928 on July 17 and August 28, and hopes that there will be numerous exhibits.

12. **The Vegetable and Fruit Shows.**—The Vegetable Show was held on September 13 and the Fruit Show on October 11. The Vegetable Show was the most successful show of its kind that has been held for many years and the quality of the exhibits was high. The great Seed-Houses assisted the show with some fine exhibits. The Fruit Show was better on the whole than that of last year, although pears were not so much in evidence. The interest in the Show on the part of the Fellows and exhibitors was well maintained. In 1928 these two Shows will be combined and will be held on October 9 in the two Halls, where better accommodation will be provided.

13. **The Great Autumn Show.**—The Great Autumn Show was held at the Holland Park Hall on September 28, 29, and 30, and the application for space again exceeded the accommodation available. The standard of the exhibits was high and the Dahlias and Roses were especially noteworthy. The Coronation Cup for the best exhibit was awarded for the exhibit of Begonias of Messrs. Blackmore & Langdon.

The Autumn Show in 1928 will be held on September 27 and 28; both the Society's Halls will be used.

14. **International Exhibition of Garden Design and Conference of Garden Planning.**—An Exhibition of Garden Design and a Conference on Garden Planning will be held in the Society's new Hall from October 17 to October 24. The Council has formed a strong Committee with the co-operation of the Royal Institute of British Architects and the Royal Society of British Sculptors. The following sections have been arranged:

"Retrospective Historical Section up to 1850."
"Garden Planning for Town and Country."
"Sculpture for Gardens and its setting."
"Public Parks and Gardens."

The Exhibition will be one of selected plans, designs, models, and garden sculpture. Designers and artists in this country as well as abroad are being invited to send in exhibits and to read papers at the Conference. The full programme will be announced in the Press.

15. **Deputations.**—La Société Nationale d'Horticulture de France celebrated its centenary during the year and the Council sent two deputations. Dr. Hill, Mr. E. A. Bunyard, and Mr. W. R. Oldham visited the summer show. The Society's Cup was awarded to the Horticultural Union of Aalsmeer (Dutch Section) for their exhibition of Lilacs and Roses, and Gold Medals to MM. Vilmorin Andrieux & Cie., for their vast and varied display, to MM. Croux et Fils, Chatenay, for Rhododendrons, to M. Defresne, Vitry, for Roses, to the Exposition Hollandaise, and to the Exposition Belge ; Silver Flora Medals to MM. C. Maron et Fils, Brunoy, for Orchids, to MM. Vacherot et Leccufle for Orchids, to M. Chantrier for Caladiums, etc., to the Ville du Havre (M. Cayeux, Supt.) for new Hydrangeas, and to the Public Gardens of Monte Carlo for Platyceriums, Pandanuses, etc., and Silver Banksian Medal to M. Thiebault, for Cacti. Sir William Lawrence and the Secretary visited the autumn show. Gold Medals were awarded to MM. Vilmorin Andrieux & Cie. (with congratulations) for Chrysanthemums and Vegetables, to MM. Cayeux et Leclerc for Dahlias, to M. L. Ferard for Chrysanthemums and herbaceous plants, to MM. Nomblot, Bruneau, for fruit trees and fruit, and to La Société d'Horticulture de Montreuil for fruit ; and a Silver-gilt Flora Medal to the École Municipale de Paris for a floral and botanical exhibit.

The International Horticultural Congress was held at Vienna and the Council sent Dr. Rendle, Mr Leak and the Director of the Wisley Garden as its representatives, who, in the name of the Council, invited the Congress to meet in London in 1930.

The Director of the Wisley Garden represented the Society at the Fifth International Genetics Congress in Berlin.

For 1928 the Council has accepted the invitation to send deputations to the Harrogate Agricultural Society's Show and to the "Floralies Gantoises," the quinquennial exhibition of the Société Royale d'Agriculture et de Botanique de Gand.

16. **Wisley.**—The wet weather of the past summer has, on the whole, suited Wisley. Except for the damage done to plums, spring flowers, and the early growths of shrubs by the disastrous frosts of April, plants have suffered little from the weather.

17. **Visitors.**—The number of visitors to the Garden again shows an increase, and the improved facilities for reaching the Garden are being gradually appreciated by Fellows. During the year Wisley was visited by members of the Imperial Agricultural Conference meeting in London, and a Conference of those responsible for the sub-stations under the Commercial Fruit Testing Scheme was held at Wisley. The Garden is maintained primarily for horticultural investigation. Enquiries and visitors in search of information are at all times welcome at the Garden.

18. **New Appointment.**—Mr. M. A. H. Tincker, M.A., M.Sc., late of the Dept. of Agriculture, Aberystwyth University, has been appointed to fill the newly created office of Keeper of the Laboratory, his special charge being the supervision of the research work and the science teaching at Wisley.

19. **Experimental Work.**—An extended scheme of experimental work designed to ascertain the effect of various soils upon plant growth, and the effect of length of day upon plant growth has been drawn up, and the necessary apparatus is being erected. Dr. Darbishire is continuing his work upon green manuring, and, with Mr. Buxton, on the reaction of sap, and its influence on flower colour. Mr. G. F Wilson has published in the JOURNAL an account of the insect pests of water-lilies, and is continuing his investigations into eelworm attacks upon plants, leaf-mining insects and aphides feeding upon roots. Mr. Dowson is pursuing his studies of diseases (especially those due to *Botrytis* and *Sclerotinia*) of bulbs, and the report of a lecture giving a general account of these diseases appears in the current JOURNAL. He is also continuing his work on carnation stem-rot, and the bacterial disease of apples referred to in the last report. Dr. Darbishire with Mr. Forsyth has carried out a number of experiments upon the effect of various chemicals upon root production in cuttings. The fruit pollination experiments have been continued as well as the records of the growth of certain plants in relation to meteorological conditions, a matter for which Wisley is very well equipped.

20. **Exhibit at Chelsea.**—As in past years an exhibit illustrating some of the investigations made at Wisley was set up at Chelsea and explained by members of the staff.

21. **Research Scholarship.**—A further development of experimental work is being arranged by the establishment of a research scholarship, the funds for which are being provided by members of the branch of horticultural industry affected, facilities for work at Wisley being given by the Council. The particular work to be undertaken by the first student appointed will be investigations in bulb growing, and especially the carrying on of research left unfinished by the late Mr. J. K. Ramsbottom.

22. **Memorial to Mr. J. K. Ramsbottom.**—In memory of J. K. Ramsbottom a bronze tablet, subscribed for by some Fellows and friends who greatly appreciated his work, is being placed in the Hall of the Laboratory.

23. **School of Horticulture.**—There are a few vacancies to be filled in the School of Horticulture next April and October, and Scholarships to be awarded, full particulars of which are published elsewhere. The course is essentially a practical one intended as a general introduction to practical horticulture for those about to take up some branch as a career.

24. **The Garden.**—The Garden under Mr. Findlay has continued to make progress. In order further to improve access to its parts a new grass path has been made through the Pinetum to a pinewood in which it is intended to make a Rhododendron plantation to include many of the new hybrids which are not yet represented at Wisley. Another new path has been made towards the rock garden and alterations are in progress at the eastern end of the rock garden slope and on the alpine meadow, while a considerable portion of the rock garden has been reconstructed.

25. **Alpine House, etc.**—The new alpine house has more than fulfilled expectations concerning its suitability as a house for plants; and the large collection of alpine plants it contains has proved a great source of interest to visitors. A range of frames has been erected near the alpine house to provide a place for the cultivation of bulbs needing some protection, and among other things a collection of Crocus species will be planted there.

26. **Exhibition Room.**—A room has also been erected in which to exhibit fruits and other things in their season in a way convenient to visitors. This is situated near the main entrance and adjacent to the new floral trial grounds.

27. **Trials.**—The new system of trial involving the maintenance of standard collections of florist's flowers outlined in the last Report has made good progress and it should prove very informative to visitors, who will be able to see and compare many varieties, particularly of herbaceous plants, growing side by side. The vegetable trials were carried out partly on the new ground at the northern end of the Garden, now set aside for vegetable trials, and they have proved its suitability for the purpose. The trials completed this year are those of Aquilegias, Annual Poppies, Parsley, Globe Beet, Sweet Corn, and late Peas, and reports on these will appear in the JOURNAL. The continuing trials include Irises, Narcissi, Dahlias, Garden Roses, Gladioli, Freesias, Nerines, Lachenalias, Phloxes, Delphiniums, Asters, Paeonies, Violas, Aubrietias, and Helianthemums, and all of these Standard Collections may be seen at Wisley.

28. **Fruit Trials.**—The Standard Collections of Fruit have grown considerably and the Commercial Fruit trials, under the charge of Mr. Rawes, of which an account is given in the JOURNAL, and which are carried out in co-operation with the Ministry of Agriculture, are making excellent progress. Those interested in new fruits are invited to inspect them at Wisley, or at one of the Sub-stations established under the scheme.

29. **Expeditions.**—During the year the seeds from Mr. Comber's Andean expedition have been received and the plants raised are being grown on for distribution. An expedition was organized (with the co-operation of several Fellows) for the collection of seeds of alpine plants in British Columbia. Mr. J. C Bennett of Victoria, B.C., kindly undertook the work involved, and though the weather in the district chosen, Mt. Garibaldi, was unpropitious, a very satisfactory collection of seeds and specimens was made. The seeds are to be sown and plants distributed to Fellows later.

30. **The Masters Lectures.**—The Masters Lectures (delivered annually by an eminent man of science upon recent scientific discoveries and their application to

horticulture) were given on June 21 and 22 by Dr. C. R. Ostenfeld of Copenhagen, who took as his subject "Some Remarks upon Hybrids between Species in Flowering Plants." For the year 1928 Professor F. V. Theobald, M.A., F.E.S., V.M.H., has been invited and he will give lectures on February 28 and 29, on "Some Recent Advances in the Control of Insect Pests."

31. **The Society's Publications.**—The publication of *Curtis's Botanical Magazine* is somewhat in arrear, but the Council has taken steps to give the Editor additional assistance and it is hoped that, during the year, the arrears will have been worked off, and the regularity of the publication ensured.

The revision of the Pritzel Index, which will now be known as the *Index Londinensis*, has advanced a stage and it is hoped that the first two volumes will be published towards the end of the year. The work itself will consist of six volumes and will take three years in all to publish. The Council notes with pleasure that the Fellows, original subscribers, and others, as well as scientific institutions in this country and abroad, have greeted the prospect of the publication by generously subscribing towards it. The Council, nevertheless, desires still further support for this great botanical reference work which was originated and has been largely financed by the Society.

32. **The Lindley Library Catalogue.**—The Lindley Library Catalogue was issued during the summer, giving a complete catalogue of the books up till 1926. It is a valuable addition to the Society's work, and the Council recommends it for purchase to Fellows interested in the Library and in horticultural study. The price of the Catalogue to Fellows is 17*s*. 6*d*.

33. **The Revised Classified List of Daffodil Names** was published and issued.

34. **The Lindley Library.**—During the year about 253 books and pamphlets have been added to the Library, and among the works which have been purchased the following may be mentioned:—Ammann's "Supellex botanica," Barrelier's "Plantae per Galliam, Hispaniam et Italiam observatae," Bauhin's "Theatri botanici," Bertholon's "De l'electricite des vegetaux," Bock's "De stirpium maxime earum, que in Germania nostra nascunter," Commelin's "Flora Malabarica," Hooker & Ball's "Tour in Morocco," Joncquet's "Hortus regius," Lobel's "Plantarum seu stirpium icones," Magnol's "Botanicum Monspeliense," Merrett's "Pina rerum naturalium Britannicarum," Munting's "Naauwkewrige beschryving der Aardgewassen," Pancovius' "Herbarium Portatile," Roessig's "Die Rosen," Trew's "Hortus nitidissimis omnem per annum superbiens floribus."

The Council wishes to take this opportunity to thank donors of books to the Society, and to the publishers for placing at its disposal recent books on horticulture, etc., for the Library and for review purposes.

35. **Revision of the Charter and Bye-Laws.***—In its report for 1926 the Council indicated the necessity, in view of the growth of the Society, for the revision of the Charters of the Society and of the Bye-laws, and it now presents the draft of a new Charter to take the place of the three existing Charters and also a draft of new Bye-laws, both of which it recommends to the Fellows for adoption.

If the proposed drafts are approved by the Annual General Meeting on February 14, a Petition will be presented to the Crown praying for the grant of a new Charter which, with the Bye-laws, will come into force directly the Royal assent has been given to the Charter.

36. **Regulations for Exhibitors and Awards.**—Last year the regulations for exhibitors and for the Society's awards were revised, and the working of the revised regulations has been satisfactory although it has been found necessary to introduce a few modifications. The Council particularly asks exhibitors to make themselves well acquainted with these regulations.

37. **The Victoria Medal of Honour.**—The Council has filled the vacancies in the list of the holders of the Victoria Medal of Honour with the following:—Mr. F. R. S. Balfour, who has taken an active part in Forestry and Arboriculture for many years past; Mr. J. G. Millais, for his work on Rhododendrons and Magnolias; Dr. O. Stapf, the Society's Editor of the *Curtis's Botanical Magazine* and the *Index Londinensis*; Mr. Harry White, a well-known raiser of Rhododendron species at his Sunningdale Nurseries; Mr. J. T. White, the pioneer of narcissus-growing in the Spalding area; and Mr. P. D. Williams, a great amateur gardener and breeder of daffodils.

---

* See pp. 115–137.

38. **The Lawrence Medal.**—The Lawrence Medal for the best exhibit staged at the Society's Shows during the year is awarded for the Rock Garden exhibit of Mr. G. G. Whitelegg at the Chelsea Show in 1927.

39. **The Veitch Memorial Trust.**—Awards have been made as follows :—

Gold Medal—To Professor L. H. Bailey, for his scientific work on behalf of horticulture.

Gold Medal—To Mr. John Basham, for his general services in fruit cultivation.

Gold Medal—To Mr. Frederick J. Hanbury, for his work in the preservation and cultivation of the British flora and in raising orchids.

Silver Medal and £50—To Mr. Frank Reader on his retirement from the service of the Society.

The following medals are offered for award in 1928 :

A Silver Medal and £5 ; a Bronze Medal and £2 10*s*.—To be awarded to the best amateur exhibits at the Harrogate Agricultural Society's Show.

40. **The Cory Cup.**—The Cory Cup has been awarded to Mr. W. B. Cranfield for Paeonia ' Orion,' which was judged to be the best new hybrid plant of garden origin shown to the Society in the course of the year.

41. **The Loder Rhododendron Cup.**—The Loder Rhododendron Cup has been awarded to Mr. E. H. Wilson, the curator of the Arnold Arboretum, in recognition of his very valuable work in introducing and describing Rhododendrons and Azaleas.

42. **The George Moore Medal.**—The George Moore Medal has been awarded to Messrs. Armstrong & Brown for *Cypripedium* × ' Chardmoore ' var. ' Mrs. Cowburn,' which was considered to be the best Cypripedium shown to the Society in 1927.

43. **The Sander Medal.**—The Sander Medal for the best greenhouse novelty shown in 1927 was awarded for the *Miltonia* × ' Wm. Pitt,' Dell Park var., exhibited by Baron Bruno Schröder.

44. **Administration of the Society's Business.**—The Council desires to draw the Fellows' attention to the increased work entailed by the growth of the Society's business and is at present finding it necessary to meet weekly. During the year the Council has met 32 times, the Finance and General Purposes Committee 24 times, the Housing Committee 14 times, the Bye-Laws Committee 10 times, the Scientific, Library, Floral, Fruit and Vegetable Committees regularly every fortnight and at the Special Shows, and the Wisley Committee monthly. In addition there have been numerous sub-committees meeting from time to time. These meetings entail an immense amount of work for the staff and are a heavy tax on the time of the members of the Council and the Committees.

45. **Increase of Accommodation.**—The Council is considering plans for alterations in the old Hall necessary to bring it into conformity with modern requirements and is taking the opportunity of providing further rooms for the staff and for the Library, both of which have outgrown the present accommodation.

46. **Retiring Members of the Council.**—The Council desires to record its high appreciation of the services of the three members who retire this year automatically, viz. : Sir William Lawrence, Mr. E. A. Bunyard and The Hon. H. D. McLaren. To each one of them the thanks of the Council and of the Society are due for the advice and assistance which they have always so readily given in all matters relating to the Society's business and affairs ; and especially to Sir William Lawrence, the Treasurer of the Society for the past four years, for his untiring work as Chairman of several Committees and as a member of many others.

47. **The Committees and Judges.**—The Society owes a great debt of gratitude to the members of all Committees and to its Judges, who have given up so much of their time to the affairs of the Society.

48. **The Press.**—The Council desires to thank the Press for the publicity which it gives to the Society's activities and for its continued goodwill.

49. **Further Acknowledgments.**—The Council desires very gratefully to acknowledge gifts to the Society in the form of seeds and plants for the Gardens, the list of which, with their donors, is published in the JOURNAL, and to thank Mr. W. B. Cranfield for his gift of ferns for the new Fernery; it also desires to thank those who have given books to the Libraries both at Vincent Square and at Wisley, and especially Mr. Edward Harding for a very generous gift of books representative of the best in American horticulture and Mrs. Peveril Turnbull, who, in memory of her husband, presented the "Botany of the Speke and Grant Expedition."

50. **The Staff.**—The Council regrets to have to announce that Mr. Frank Reader, after having faithfully served the Society for a period of over thirty-seven years, retired at the end of the year 1927. Mr. Frank Reader is well known to a great number of the Fellows for his great courtesy and tact in dealing with all matters of the Society. In appreciation of his services the Council has voted Mr. Reader on his retirement the sum of £650.

The Council wishes to take this opportunity to thank the members of the Society's staff both at Vincent Square and at Wisley for the loyal and diligent way in which they have carried out their duties.

Signed on behalf of the Council,
LAMBOURNE,
President.

31*st December*, 1927.

Dr. ANNUAL REVENUE & EXPENDITURE ACCOUNT

	£	s.	d.	£	s.	d.	£	s.	d.
To ESTABLISHMENT CHARGES—									
Ground Rent—									
New Hall, 1927	1,200	0	0						
Vincent Square, 1927	690	0	0						
				1,890	0	0			
Rates and Taxes				1,130	2	8			
Water Rate				79	8	0			
Electric Light				336	19	8			
Gas				156	8	3			
Salaries and Wages				5,536	12	7			
Annuities				52	0	0			
Printing and Stationery				1,283	4	4			
Publications				633	3	5			
Postages				1,083	18	10			
Fuel				135	13	6			
Professional Fees				637	3	4			
Gratuities				193	17	2			
Repairs and Renewals				248	12	5			
Miscellaneous Expenses				155	9	6			
							13,552	13	8
,, INSURANCES							121	18	0
,, JOURNAL, PRINTING AND POSTAGE							3,811	13	9
,, BOTANICAL MAGAZINE							439	16	4
,, STAFF PENSIONS				749	7	5			
Less contributed by the Staff, as per scheme				276	12	6			
							472	14	11
,, MEETINGS—									
Spring Meeting (Chelsea) not including Office Expenses				5,025	14	1			
Autumn Meeting (Holland Park) do.				1,069	18	5			
Special Autumn Meeting (Fruit Show) do.				830	15	3			
Expenses, Floral Meetings and Conferences				711	2	4			
Council, Committee and Deputation Expenses				800	7	6			
Painting Certificates				267	18	11			
							8,705	16	6
,, INSPECTION OF GARDENS							365	3	7
,, PRIZES AND MEDALS—									
Awarded at Society's Meetings							955	0	4
,, CONTRIBUTION TO LINDLEY LIBRARY—									
Purchase of Books				452	12	6			
Contribution to Expenses, as per Trust A/c.				263	13	10			
Library Catalogue				422	17	10			
							1,159	4	2
,, SPECIAL EXPENDITURE—									
Pritzel Revision Fund				1,160	8	7			
British Columbia Expedition				100	0	0			
Andes ,,				100	0	0			
Clarence Elliott ,,				50	0	0			
Kingdon Ward (1928) ,,				150	0	0			
							1,560	8	7
,, DEPRECIATION—									
Hall Glass Roof, Furniture, and Appliances for Meetings, &c.							409	6	0
,, SCHOLARSHIPS—									
R.H.S. Working Scholarships							374	14	6
,, EXAMINATIONS IN HORTICULTURE—									
Expenses				241	5	4			
Less Fees				198	13	0			
							42	12	4
,, BALANCE carried forward							27,653	17	11
							£59,625	0	7
,, WISLEY—									
Capital Expenditure				242	5	3			
Excess of Expenditure over Revenue				10,656	3	3			
							10,898	8	6
,, GENERAL RESERVE FUND							15,000	0	0
,, WEATHER INSURANCE FUND FOR CHELSEA AND OTHER MEETINGS							57	15	3
,, BALANCE, AS PER BALANCE SHEET							1,697	14	2
							£27,653	17	11

FOR YEAR ENDED 31st DECEMBER, 1927. Cr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				39,473	14	7
,, ENTRANCE FEES				712	19	0
,, DIVIDENDS AND INTEREST	5,872	7	3			
,, do. do. DAVIS TRUST . .	51	8	10			
				5,923	16	1
,, MEETINGS—						
Spring Meeting	6,669	2	6			
Autumn Meeting	651	8	6			
Takings at Hall Meetings	416	18	0			
				7,737	9	0
,, HALL LETTINGS	4,122	16	9			
Less Labour Expenses	616	10	3			
				3,506	6	6
,, JOURNALS AND OTHER PUBLICATIONS—						
Advertisements	689	15	8			
Sale of Publications	518	12	6			
				1,208	8	2
,, PRIZES AND MEDALS				167	11	6
,, LIFE COMPOSITIONS—						
Being amount paid by Fellows, now deceased				262	10	0
,, RENT OF FREEHOLD PROPERTY . . .				241	16	6
,, INSPECTION OF GARDENS				390	9	3
				£59,625	0	7

	£	s.	d.
By Balance brought forward	27,653	17	11
	£27,653	17	11

Dr. **VINCENT SQUARE—BALANCE**

LIABILITIES.

	£	s.	d.	£	s.	d.
To Capital Funds Account	51,099	18	2			
Less Fees paid by Fellows now deceased .	262	10	0			
	50,837	8	2			
,, Life Compositions, 1927	686	14	0			
				51,524	2	2
,, Sundry Creditors				3,148	2	3
,, Subscriptions, paid in advance . . .	752	6	6			
Do. do. Pritzel Index	625	5	0			
				1,377	11	6
,, General Reserve Fund—						
Balance at 31st December, 1926	78,000	0	0			
Added 1927	15,000	0	0			
				93,000	0	0
,, Supplementary Pension Fund				306	19	5
,, Depreciation and Renewals Fund—						
Balance at 31st December, 1926	5,214	4	2			
Added 1927	409	6	0			
				5,623	10	2
,, Weather Insurance Fund for Chelsea and other Meetings—						
Balance at 31st December, 1926	2,942	4	9			
Added 1927	57	15	3			
				3,000	0	0
,, Laboratory Prize Fund—						
Balance at 31st December, 1926 . . .	14	8	11			
Dividends (Nicholson Memorial Fund) . .	7	8	5			
				21	17	4
,, Williams Memorial Fund	107	12	4			
,, Masters Memorial Fund	127	19	5			
,, Schröder Pension Fund	6	6	8			
,, Lindley Library Trust	10	0	0			
,, Sir James Knott Trust	135	0	0			
,, Veitch Memorial Fund	293	15	0			
,, Moore Medal Trust Fund	9	6	9			
				690	0	2
,, Mrs. Edward Harding Cup Fund				59	7	4
,, General Revenue Account brought forward from 1926	57,421	10	2			
,, Revenue for the Year 1927 as per Annexed Account	1,697	14	2			
				59,119	4	4
				£217,870	14	8

ASSETS.

	£ s. d.	£ s. d.	£ s. d.
By Capital Expenditure—			
,, Hall and Offices—			
As at 31st December, 1926		41,277 13 4	
,, Furnishing Hall and Offices—			
As at 31st December, 1926	2,824 9 10		
Expended during 1927	11 13 0		
		2,836 2 10	
,, New Hall—			
As at 31st December, 1926	13,959 19 1		
Add Expended during 1927	46,245 8 4		
		60 205 7 5	
			104,319 3 7
,, Freehold Property, Wisley—			
As at 31st December, 1926			13,158 13 9
,, Supplementary Pension Fund Investment Account			306 19 5
,, Appliances for Meetings			366 14 3
,, Sundry Debtors and Payments made in Advance			1,879 1 3
,, Weather Insurance Fund, Investment Account			
5% War Loan at 31st December, 1926 £2,075 15*s.* 11*d.* *cost*		2,942 4 9	
Add 1927 £57 0*s.* 0*d.* ,,		57 15 3	
			3,000 0 0
,, Botanical Magazine—			
Stock		100 0 0	
Sundry Debtors		103 9 6	
			203 9 6
,, Investments of Depreciation and Renewals Fund—			
5% War Loan 1929–47, £4,578 7*s.* 2*d.* *cost*		4,303 12 6	
3½% Conversion Loan, 1961, £1,057 14*s.* 8*d.* ,,		803 11 8	
2¾% Plymouth Corporation Stock, 1918–58, £225 9*s* 4*d.* ,,		111 6 5	
Add Cash for Investment		404 19 7	
			5,623 10 2
,, Woking Water Co.—			
Deposit in respect of laying water mains from Ripley to Wisley Gardens			1,260 0 0
,, Education Charts			24 0 1
,, Investments—			
As per Schedule			45,841 0 6
,, General Reserve Fund—			
Investments		30,000 0 0	
Cash on Deposit—Pritzel Subscriptions in Advance		600 0 0	
National Discount Co.		7,000 0 0	
			37,600 0 0
,, Cash at Bank		4,693 1 9	
Less awaiting Investment, Depreciation and Renewals Fund		404 19 7	
			4,288 2 2
			£217,870 14 8

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st December, 1927. In the total of Assets, £217,870 14*s.* 8*d.*, are included investments and Cash amounting to a total sum of £5,623 10*s.* 2*d.*, representing depreciation reserves on account of such matters as roof renewal, hall painting, &c., and these funds are not available for the General Purposes of the Society.

ALFRED C. HARPER, F.C.A., *Auditor*
(Harper Brothers & Feather, *Chartered Accountants*),
35 Great Tower Street, London, E.C. 3.

10th January, 1928.

Dr. WISLEY GARDENS—ANNUAL REVENUE & EXPENDITURE

	£	s.	d.	£	s.	d.
To Salaries—						
Wisley Gardens and Research Station				4,292	6	4
,, Rates and Taxes	224	4	9			
,, Water Rate	78	9	8			
,, Insurances	162	4	0			
,, Labour	4,522	2	7			
,, Garden Implements	28	3	9			
,, Loam and Manure	252	11	11			
,, Repairs	1,438	11	1			
,, Fuel	761	18	1			
,, Professional Fees	209	14	4			
				7,678	0	2
,, Miscellaneous Expenses—						
Garden and Farm	1,000	18	1			
Laboratory	54	14	6			
Trees and Shrubs	103	9	4			
				1,159	1	11
,, Staff Pensions	311	5	0			
Less contributed by staff, as per scheme	155	12	6			
				155	12	6
,, Depreciation—						
Glass Houses, Plant, and Materials	515	6	0			
Motors	90	0	0			
				605	6	0
				£13,890	6	11

ACCOUNT FOR YEAR ENDED 31st DECEMBER, 1927. Cr.

	£	s.	d.
By DIVIDENDS AND INTEREST	1,369	4	9
,, DONATION	1	1	0
,, PRODUCE SOLD	861	3	7
,, ANALYSIS FEES	29	12	6
,, STUDENTS' FEES	63	0	0
,, CONTRIBUTION BY MINISTRY OF AGRICULTURE— On account of Fruit Testing Station	910	1	10
,, BALANCE, being excess of Expenditure over Income, carried to Revenue and Expenditure Account, Vincent Square	10,656	3	3
	£13,890	6	11

Dr. WISLEY GARDENS—BALANCE

LIABILITIES.

	£	s.	d.	£	s.	d.
To Capital Funds Account—						
As at 31st December, 1926	35,802	12	3			
Add Payments by R.H.S., 31st December, 1927	242	5	3			
				36,044	17	6
,, Endowment Trust Fund				23,342	7	11
(The difference between this Fund and the Investment account on the Assets side is due to a change in the Investments which was made in 1921.)						
Depreciation and Renewals Reserve Fund—						
As at 31st December, 1926	5,111	19	3			
Added to Fund, 1927	250	0	0			
				5,361	19	3
				£64.749	4	8

SHEET, 31st DECEMBER, 1927. Cr.

ASSETS.

						£	s.	d.	£	s.	d.
By DWELLING HOUSES—											
As at 31st December, 1926						5,651	17	4			
,, GLASS HOUSES, RANGES, POTTING SHEDS—											
As at 31st December, 1926			5,920	0	4						
Additions during 1927			470	0	0						
						6,390	0	4			
,, LABORATORY—											
As at 31st December, 1926						20,669	13	2			
									32,711	10	10
N.B.—The Hanbury Trust Estate is under the Trust Deed, vested in the Society only so long as it is in the position to use it as an Experimental Garden. Accordingly the Expenditure thereon by the Society is an Asset only so long as the Gardens continue to be used by the Society.											
,, STOCK FUEL									100	0	0
,, MOTOR CARS AND LORRY						274	11	6			
Less Depreciation						90	0	0			
									184	11	6
,, VALUATION OF PLANT AND LOOSE EFFECTS (as valued by the Director)—											
Gardens and Laboratory						1,733	11	0			
Farm						1,339	15	3			
									3,073	6	3
,, LIBRARY									354	1	7
,, INVESTMENT OF DEPRECIATION AND RENEWALS RESERVE ACCOUNT—											
5% War Loan, 1929–47	£2,738/10/5	*cost*				2,637	5	11			
3½% Conversion Loan, 1961	£1,041/6/2	,,				736	12	0			
5% London Cnty Stk., 1940–60	£785/5/3	,,				661	13	6			
2½% Met. Cons. Stk, 1919–49	£1,287/9/2	,,				662	19	3			
2¾% Plymouth Cor Stock, 1918–58	£288/8/10	,,				142	1	0			
6% Plymouth Cor. Rd. Stk., 1940–50	£159/18/4	,,				151	12	4			
2½% Bristol Cor. Red. Deb. Stock, 1957	£795/14/6	,,				369	15	3			
									5,361	19	3
,, ENDOWMENT TRUST FUND INVESTMENTS—											
5% War Loan, 1929–47	£9,350	*cost*				8,972	7	11			
3½% Conversion Loan, 1961	£2,484/4/1	,,				2,000	0	0			
5% London Cnty. Stk, 1940–60	£600					505	12	0			
3½% London County Con Stock	£135/8/4					130	0	0			
2½% Met. Con Stk., 1919–49	£970					499	12	0			
6% Ply. Cor. Rd. Stk, 1940–50	£30/9/4					29	6	4			
2¾% Plymouth Cor. Stk., 1918–58	£400					197	1	0			
2½% Bristol Cor.Red.Deb.Stk.,1957	£600					278	18	6			
London&N.E.Rly.4%Deb.Stk.	£3,500					3,535	0	0			
Can. Pac. Rly. 4% Per. Cons. Deb. Stock	£4,632	,,				3,890	17	6			
Buenos Ayres Gt. S. Rly. 5% Non-Cum. Pref. Stock	£2,500	,,				2,825	0	0			
City of Moscow Loan 1912, 4½% Bonds	*Est. value.* £6,000	,,				100	0	0			
									22,963	15	3
(No interest was received during the year on City of Moscow Loan)											
									£64,749	4	8

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st December, 1927.

ALFRED C. HARPER, F.C.A., *Auditor*
(HARPER BROTHERS & FEATHER, *Chartered Accountants*),
35 Great Tower Street, London, E.C.3.

10th January, 1928.

Dr.

ALFRED DAVIS

Bequeathed to the Society in 1870 for Annual Prizes

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926	946	0	3			
	946	0	3			
,, Dividends received 1927				51	8	10

WILLIAMS

Raised by Donations in 1891 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926	204	2	5			
	204	2	5			
,, Balance 31st December, 1926				99	13	6
,, Dividends received 1927				7	18	10
				107	12	4

MASTERS

Raised by Donations in 1908 in Memory of Dr. Masters

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926	542	17	0			
	542	17	0			
,, Balance 31st December, 1926				127	19	5
,, Dividends received 1927				20	0	0
				147	19	5

NICHOLSON

Raised by Donations in 1908 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926	180	14	4			
	180	14	4			
,, Dividends received 1927				7	8	5
				7	8	5

SCHRÖDER

Provided by Royal Horticultural Society in Memory of the late Baron

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926	557	14	6			
,, Balance 31st December, 1926				6	6	8
,, Dividends received 1927				20	0	0
				26	6	8

TRUST FUND. Cr.

or in any other way the Council may determine.

	£	s.	d.	£	s.	d.
By London County 5% Stock, 1940–60, £375 .	316	0	0			
„ Met. Consd. 2½% do. 1919–40, £610 . .	314	4	0			
„ Plymouth Corpn. 2¾% Red. Stk., 1918–58, £200	98	10	6			
„ do. 6% do 1940–50, £32 7 0	31	2	3			
„ Bristol Corpn. 2½% Deb. Stk., 1957, £400 .	186	3	6			
	946	0	3			
„ Revenue and Expenditure Account . . .				51	8	10

MEMORIAL FUND.

B. S. Williams towards Prizes and Medals.

	£	s.	d.	£	s.	d.
By East India Railway Co. Annuity, Class B £7 .	168	0	0			
„ New South Wales Government 4% Inscribed Stock, 1942–62, £36 3*s.* 1*d.* . . .	36	2	5			
	204	2	5			
„ Balance in hands of R.H. Society . . .				107	12	4
				107	12	4

MEMORIAL FUND.

towards the Provision of one or more Annual Lectures.

	£	s.	d.	£	s.	d.
By London, Midland & Scottish 4% Preference Stock, £250	290	13	6			
„ London, Midland & Scottish 4% Guaranteed Stock	252	3	6			
	542	17	0			
„ Lectures given				20	0	0
„ Balance in hands of R.H. Society . . .				127	19	5
				147	19	5

MEMORIAL FUND.

George Nicholson for Prizes.

	£	s.	d.	£	s.	d.
By Local Loans, 3%, £31 11*s.* 0*d.*	20	1	5			
„ Tasmanian Government 4% Inscribed Stock, 1940–50, £162 4*s.* 5*d.*	160	12	11			
	180	14	4			
„ Wisley Laboratory Prize Fund				7	8	5
				7	8	5

PENSION.

Schröder to pay to Gardeners' Royal Benevolent Institution for one Pension.

	£	s.	d.	£	s.	d.
By Great Western Railway 4% Debenture Stock, £500	557	14	6			
„ Gardeners' Royal Benevolent Institution . .				20	0	0
„ Balance in hands of R.H. Society . . .				6	6	8
				26	6	8

Dr. **LINDLEY LIBRARY**

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926 . .	8,997	12	11			
„ Contribution from R.H. Society, 31st December, 1927	452	12	6			
	9,450	5	5			
To Balance 31st December, 1926				10	0	0
„ Dividends and Donations				45	9	6
„ Contribution from R.H. Society, 31st December, 1927				263	13	10

PRITZEL REVISION

Fund to be raised for the Revision of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926 . .	859	2	2			
„ Contribution by R.H. Society				1,160	8	7
„ Dividends received 1927				34	3	10
				1,194	12	5

SIR JAMES KNOTT

Bequeathed to the Society in 1920 for the purpose

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926 . .	600	0	0			
„ Balance, 31st December, 1926				142	10	0
„ Dividends received 1927				30	0	0
				172	10	0

VEITCH MEMORIAL

For the Encouragement

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1926 . .	1,673	19	1			
Balance in hands of R.H. Society . . .				333	14	1
Dividends and Interest received 1927 . .				83	13	11
				417	8	0

MOORE MEDAL

Presented to the Society in 1926 to provide a medal annually for the best

	£	s.	d.	£	s.	d.	£	s.	d.
Amount of Fund	250	0	0						
Less Cost of Die, Medal and Engraving .	59	9	6						
				190	10	6			
To Dividend received							9	6	9

TRUST.

Cr.

	£	s.	d.	£	s.	d.
By London, Midland & Scottish Railway 4% Preference Stock, £1,137	1,458	15	7			
„ Value of Library, 31st December, 1926	7,538	17	4			
„ Purchase of Books, 1927	452	12	6			
	9,450	5	5			
By Librarian's Salary				300	0	0
„ Insurance				9	3	4
„ Balance in hands of R.H. Society				10	0	0
				319	3	4

FUND.

Pritzel's Iconum Botanicarum Index.

	£	s.	d.	£	s.	d.
By India 2½% Stock, £1,367 13s. 6d.	859	2	2			
„ Expenses of Revision, 1927				1,194	12	5
				1,194	12	5

TRUST.

of providing a Scholarship for Wisley Students.

	£	s.	d.	£	s.	d.
By War Loan 5% 1929–47	600	0	0			
„ Cash expended				37	10	0
„ Balance in hands of R.H. Society				135	0	0
				172	10	0

TRUST FUND.

of Horticulture.

	£	s.	d.	£	s.	d.
By Victorian Government 5% Inscribed Stock	1,354	0	1			
„ War Loan, 5% 1929–47	319	19	0			
	1,673	19	1			
„ Amount distributed				123	13	0
„ Balance in hands of R.H. Society				293	15	0
				417	8	0

TRUST FUND.

new Cypripedium shown to the R.H. Society during the year.

	£	s.	d.	£	s.	d.
War Loan 5% 1927–47 . . . £186 15s. 0d. *cost*	190	10	6			
By Balance in hands of R.H. Society				9	6	9

SCHEDULE OF INVESTMENTS.

31st December, 1927.

		£	s.	d.
5 % War Loan (1929–1947) £8,981 10s. 0d.	cost	8,704	17	1
3½ % Conversion Loan (1961) £13,440 16s. 4d.	,,	9,618	6	4
3 % Local Loans £5,800	,,	6,006	16	6
2½ % India Stock £186 9s. 9d.	,,	109	2	2
3½ % Dominion of Canada Registered Stock (1930–1950) £2,000	,,	2,000	0	0
5 % London County Stock (1940–1960) £2,724 14s. 9d.. .	,,	2,295	16	0
2½ % Metropolitan Consolidated Stock (1919–1949) £4,462 10s. 10d.	,,	2,298	11	9
2¾ % Plymouth Corporation Stock (1918–1958) £786 1s. 10d.	,,	386	19	7
6 % Plymouth Corporation Red. Stock (1940–1950) £551 9s. 0d.	,,	522	10	6
2½ % Bristol Corporation Red. Debenture Stock (1957) £2,704 5s. 6d.	,,	1,257	1	3
4½ % Central Argentine Railway, Limited, Consolidated Preference Stock £2,800	,,	2,907	3	6
4 % Central Argentine Railway, Limited, Debenture Stock £600	,,	537	15	10
5 % Havana Terminal Railroad Company Mortgage Debenture Bonds £8,300	,,	8,946	0	0
Mortgage on Freehold £250	,,	250	0	0
		£45,841	0	6

ON ACCOUNT OF GENERAL RESERVE FUND.

		£	s.	d.
5 % War Loan (1929–1947) £19,837 9s. 6d.	cost	19,951	7	9
3½ % Conversion Loan (1961) £6,606 17s. 5d.	,,	5,049	10	0
London & North Eastern Railway 4 % Debs., £5,510 .	,,	4,999	2	3
		£30,000	0	0

GENERAL MEETING.

FEBRUARY 28, 1928.

Mr. H. V. TAYLOR, M.B.E., B.Sc., in the Chair.

One hundred and forty-four Fellows and five Associates were elected, and two Societies affiliated.

The first Masters Memorial Lecture on "Some Recent Advances in the Control of Insect Pests," written by Professor F. V. Theobald, M.A., F.E.S., V.M.H., was, in the absence of Professor Theobald, read by Dr. Brade-Birks (see vol. **53**, p. 201).

GENERAL MEETING.

MARCH 13, 1928.

Mr. J. C. F. FRYER in the Chair.

One hundred and forty-one Fellows and five Associates were elected, and four Societies affiliated.

The second Masters Memorial Lecture on "Some Recent Advances in the Control of Insect Pests," written by Professor F. V. Theobald, M.A., F.E.S., V.M.H., was, in the absence of Professor Theobald, read by Dr. Brade-Birks (see vol. **53**, p. 210).

GENERAL MEETING.

MARCH 27, 1928.

Mr. G. P. BAKER in the Chair.

One hundred and forty-nine Fellows and four Associates were elected, and one Society affiliated

A lecture on "Anemones" was given by Mr. E. A. Bowles, M.A., F.L.S., V.M.H.

GENERAL MEETING.

APRIL 11, 1928.

The Rt. Hon. The LORD LAMBOURNE, P.C., G.C.V.O., V.M.H., in the Chair.

One hundred and twelve Fellows and three Associates were elected, and one Society affiliated.

DAFFODIL SHOW.

APRIL 17 and 18, 1928.

CHIEF AWARDS IN THE COMPETITIVE CLASSES.

The Engleheart Cup and a Silver-gilt Lindley Medal, for 12 varieties of Daffodils raised by the Exhibitor.

To Mr. G. L. Wilson.

The Barr Silver Cup, for 36 varieties of Daffodils.

To Mrs. A. West.

Silver-gilt Lindley Medal, for 12 varieties not in commerce.

To Mr. J. L. Richardson.

DEPUTATION TO GHENT QUINQUENNIAL EXHIBITION.

APRIL 21–29, 1928.

A deputation consisting of Sir William Lawrence, Bt., Mr. W. R. Oldham, J.P., and Mr. George Monro, C.B.E., was appointed by the Council to visit the International Horticultural Exhibition at Ghent organized by the Société Royale d'Agriculture et de Botanique de Gand. The deputation made the following awards :—

Gold Medal.

To Messrs. Van Houtte, Ltd., Lapint, for specimen stove plants.
To Messrs. Sanders, Bruges, for Orchids.
To Monsieur Th. Pauwels, Meirelbeke, for Orchids.
To Monsieur Vermaercke-de-Meyer, Gendbrugge, for Orchids.
To Messrs. Flandria, Bruges, for *Azalea indica.*
To Monsieur Th. Piens, Melle, for *Azalea indica* 'Apollo.'
To The Aalsmeer Growers, Aalsmeer, for a collection exhibit of cut Lilac, Roses, and Cherries.
To Messrs. Vilmorin, Andrieux et Cie, Paris, for a collective exhibit.
To Mr. C. G. van Tubergen, junr., Haarlem, for Lilies and bulbous plants.
To the Central Committee of Bulb Growers of Holland, for display of cut Tulips.

GENERAL MEETING.

MAY 8, 1928.

Rev. R. MEYER in the Chair.

One hundred and ninety Fellows and ten Associates were elected, and four Societies affiliated.

A lecture on "Florists' Tulips" was given by Mr. C. W. Needham.

CHELSEA SHOW.

MAY 23–25, 1928.

Held in the Royal Hospital Gardens, Chelsea.

The following accepted the Council's invitation to assist in judging the exhibits :

BAKER, HIATT. C.
BEAN, W. J., I.S.O., V.M.H.
BECKETT, E., V.M.H.
BILNEY, W. A., J.P., V.M.H.
CAMPBELL, D.
CHRISTY, E. H.
COOK, C. H.
COOK, T. H.
COOKSON, CLIVE
CORY, R., F.L.S.
CURTIS, C. H., F.L.S.
EARL, W. J.
FINDLAY, R.
GIBBS, Hon. VICARY, V.M.H.
GIBSON, J.
HALES, W., A.L.S.
HALL, Sir DANIEL, K.C.B., M.A., F.R.S.
HANBURY, F. J., F.L.S., V.M.H.
HARROW, R. L., V.M.H.
HEADFORT, Marquess of, J.P., D.L.
HILL, A. W., C.M.G., M.A., Sc.D., F.R.S., F.L.S.
HOLLAND, E. J., J.P.
IRVING, W.
JORDAN, F.
LADDS, F.
LAWRENCE, Sir WILLIAM, Bt.
LONG, Capt. B. R.
LYTTEL, Rev. Prof. E. S.
MCLAREN, Hon. H. D., C.B.E., J.P.
MCLEOD, J. F.
MAWSON, E. P., F.R.I.B.A.
MAY, H. B., V.M.H.
METCALFE, A. W.
MOORE, Sir FREDERICK W., M.A., F.L.S., V.M.H.
OSBORN, A.
PAGE, W. H.
PERKINS, H.
PETTIGREW, W. W., V.M.H.
PILKINGTON, G. L.
PRESTON, F. G.
RAMSDEN, Sir JOHN F., Bt.
ROTHSCHILD, LIONEL DE
SHAW, C.
SHILL, J. E.
TITCHMARSH, C. C., N.D.H.
UNWIN, W. J.
WALLACE, W. E., J.P., V.M.H.
WETTERN, H. L.
WHITE, E., V.M.H.
WILDING, E. H.
WILLIAMS, C.
YELD, G., M.A., V.M.H.

List of Awards.

Sherwood Cup, for the most meritorious exhibit in the Show.

To the Hon. Vicary Gibbs (gr. E. Beckett), for vegetables.

Commemoration Cup and £30 for stove and greenhouse plants staged on an area of 300 square feet.

To L. R. Russell, Ltd.

Second Prize, Silver Cup and £20.

To H. B. Brandt, Esq. (gr. H. Cook).

Third Prize, Silver Cup and £10.

To A. P. Brandt, Esq. (gr. J. W. Barks).

Cain Cup, for the best exhibit shown by an Amateur.

To Lady Aberconway and the Hon. H. D. McLaren for Primulas.

Orchid Challenge Cup, for the best group of orchids shown by an Amateur in a space not exceeding 100 sq. ft.

To F. J. Hanbury, Esq.

Orchid Challenge Cup, for the best group of orchids shown by an Amateur in a space not exceeding 60 sq. ft.

To J. J. Joicey, Esq. (gr. J. Mackay).

Gold Medal.

To Messrs. R. Bolton & Son, for Sweet Peas.
To Messrs. R. Wallace & Co., Ltd., for a mixed group of Lilies, Irises, Rhododendrons, and hardy plants.
To the Hon. Vicary Gibbs (gr. E. Beckett), for vegetables.
To Messrs. Allwood Bros., for Carnatio[illegible]d Pinks.
To Messrs. Chaplin Bros., Ltd., for Roses.
To Messrs. Charlesworth & Co., Ltd., for Orchids.
To Messrs. Blackmore & Langdon, for Begonias.
To Baron B. Schröder (gr. E. J. Henderson), for Amaryllis.
To Messrs. Sutton & Sons, for greenhouse plants from seed.
To Messrs. Hillier & Sons, for trees and shrubs.
To Mr. B. Symons-Jeune, for a rock garden.
To Mr. G. G. Whitelegg, for a rock garden.
To Lady Aberconway and the Hon. H. D. McLaren, for Primulas.

Silver Cup.

To Messrs. J. Cheal & Sons, Ltd., for a garden.
To Messrs. W. H. Gaze & Sons, Ltd., for a garden.
To Messrs. R. Wallace & Co., Ltd., for a garden.
To Messrs. Barr & Sons, for Tulips and bulbous Irises.
To Messrs. A. & W. Perry, for hardy ferns.
To Messrs. T. Rivers & Son, Ltd., for fruit trees in pots.
To Mr. James Douglas, for Border Carnations.
To Messrs. C. Engelmann, Ltd., for Carnations.
To the Donard Nursery Co., for shrubs.
To Messrs. W. Fromow & Sons, for Japanese Maples.
To Mr. H. J. Jones, for Hydrangeas.
To Messrs. James Carter & Co., for Gloxinias, Schizanthus, Cinerarias, Salpiglossis, Sweet Peas, and other florists' flowers.
To Messrs. H. G. Alexander, Ltd., for Orchids.
To Messrs. Armstrong & Brown, for Orchids.
To Messrs. Cowan & Co., for Orchids.
To Sir Jeremiah Colman, Bt. (gr. J. Collier), for Orchids.
To Messrs. Ben. R. Cant & Sons, Ltd., for Roses.
To Messrs. Clarence Elliott, Ltd., for a rock garden.
To Mr. A. Gavin Jones, for a rock garden.
To Messrs. Pulham & Son, for a rock garden.

To Messrs. Oliver & Hunter, for Primulas.
To Messrs. M. Prichard & Son, for rock-garden plants.
To Mr. F. G. Wood, for rock-garden plants.

Silver-gilt Flora Medal.

To Messrs. R. & G. Cuthbert, Ltd., for Azaleas.
To Messrs. J. Waterer, Sons, & Crisp, Ltd., for Rhododendrons.
To Mr. G. G. Whitelegg, for Azaleas.
To Messrs. Dobbie & Co., for Tulips.
To Messrs. Dobbie & Co., for Sweet Peas.
To Mr. H. Hemsley, for a garden.
To the Ravenhead Sanitary Pipe & Brick Co., Ltd., for a garden.
To Messrs. Vernon Bros., for a garden.
To Messrs. Wm. Wood & Son, Ltd., for a garden.
To Messrs. G. Bunyard & Co., Ltd., for Irises.
To Messrs. A. Perry, for a mixed group of herbaceous and alpine plants, Lilies, etc.
To the Yokohama Nursery Co., for a mixed group of Japanese dwarf trees, Kurume Azaleas, and miniature gardens.
To Messrs. W. Cutbush & Son, Ltd., for clipped trees and Hydrangeas.
To Mr. C. H. Herbert, for Pinks.
To Messrs. Frank Cant & Co., Ltd., for Roses.
To Messrs. Bakers, Ltd., for herbaceous plants.
To Messrs. A. Charlton & Sons, for a mixed group of trees and shrubs.
To Messrs. R. & G. Cuthbert, Ltd., for flowering shrubs.
To Mr. G. Reuthe, for shrubs and Rhododendrons.
To Messrs. W. Cutbush & Son, Ltd., for a rock garden.
To M. Marcel De Smet, for a rock garden.
To Messrs. Hodsons, Ltd., for a rock garden.
To Colonel W. Kemmis, for Primulas.
To Dr. John Macwatt, for Primulas.
To Messrs. Clarence Elliott, Ltd., for alpine plants.
To Mr. W. E. T. Ingwersen, for rock garden plants and dwarf Conifers.
To Mrs. Walter Jones, for Meconopsis.
To Mr. W. Wells, junr., for alpine plants.

Silver-gilt Banksian Medal.

To Mr. T. M. Endean, for Cacti and succulents.
To Mr. S. Smith, for Cacti and succulents.
To Messrs. M. Koster & Sons, for Rhododendrons.
To Messrs. Alex. Dickson & Sons, Ltd., for Sweet Peas.
To Mr. Sanders, for Orchids.
To Mr. F. J. Hanbury, for Orchids.
To Mr. J. J. Joicey (gr. J. Mackay), for Orchids.
To Messrs. G. Bunyard & Co., Ltd., for Apples and Pears.
To Mr. H Prins, for a mixed group of bulbous plants and Pæonies.
To Messrs. Bees, Ltd., for herbaceous and rock-garden plants.
To Mr. James MacDonald, for a garden.
To Messrs. Skelton & Kirby, for a garden.
To Messrs. J. Cheal & Sons, Ltd., for shrubs.
To Messrs. G. Jackman & Son, for Clematis.
To Mr. John Klinkert, for topiary work.
To Mr. R. C. Notcutt, for Brooms, Lilacs, and other shrubs.
To Messrs. L. R. Russell, Ltd., for trees, shrubs, and climbers.
To Messrs. J. Waterer, Sons, & Crisp, Ltd., for shrubs.
To Messrs. Blackmore & Langdon, for Delphiniums.
To Mr. G. R. Downer, for Lupins.
To Messrs. J. Waterer, Sons, & Crisp, Ltd., for herbaceous plants.
To Messrs. Wilson & Agar, for herbaceous plants.
To Messrs. E. Webb & Sons, Ltd., for Cinerarias, Schizanthus, Gloxinias, Primulas, etc.
To Mr. Elisha J. Hicks, for Roses.
To Mr. S. Sims, for a rock garden.
To Colonel C. Brook, for Primulas.
To Mr. G. H. Dalrymple, for Primulas.
To Mr. W. E. T. Ingwersen, for Primulas.
To Messrs. Bowell & Skarratt, for alpine plants.
To Messrs. Clarence Elliott, Ltd., for trough gardens.
To Messrs. Tuckers, Ltd., for rock-garden plants.

Silver Flora Medal.

To Mr. F. Street, for Rhododendrons.
To Mr. A. Dawkins, for Tulips.
To Mr. Ernest Dixon, for a garden.
To Messrs. Hodsons, Ltd., for a garden.
To Messrs. John Scott & Co., for a garden.
To the Orpington Nurseries Co., Ltd., for Irises.
To Messrs. A. F. Dutton, Ltd., for Carnations.
To Messrs. Stuart Lowe & Co., for Carnations.
To Messrs. Carter, Page & Co., Ltd., for Dahlias.
To Messrs. Hewitt & Co., Ltd., for Delphiniums and Lupins.
To Messrs. M. Prichard & Sons, for herbaceous plants.
To Messrs. Fletcher Bros., Ltd., for trees, shrubs, Conifers.
To Mr. A. Gavin Jones, for rock-garden plants.
To Messrs. J. Waterer, Sons, & Crisp, Ltd., for rock-garden plants and dwarf shrubs.
To Messrs. W. H. Rogers & Sons, for rock-garden plants.

Silver Banksian Medal.

To Messrs. R. Neal & Sons, Ltd., for Rhododendrons, Azaleas, and Kalmias.
To Mr. W. C. Slocock, for Rhododendrons.
To Mr. J. Stevenson, for Sweet Peas.
To Messrs. Daniels Bros., Ltd., for a mixed group of Schizanthus and Aquilegias.
To Messrs. De Goede Bros., for a mixed group of Dutch Irises, Tulips, Gladioli, etc.
To Mr. G. W. Miller, for a mixed group of Tulips and herbaceous plants.
To Messrs. Robert Green, Ltd., for Bay trees.
To the Hollamby's Nurseries, for trees, shrubs, and Conifers.
To Mr. W. West Neve, for tree Pæonies.
To Messrs. Wm. Watson & Sons, Ltd., for hardy Brooms.
To Messrs. W. Easlea & Sons, for Roses.
To Messrs. Bakers, Ltd., for Primulas.
To the Backhouse Nurseries, Ltd., for plants and dwarf shrubs for the rock garden.
To Messrs. Bakers, Ltd., for rock-garden plants.
To Messrs. H. Langridge & Co., for rock-garden plants.
To Mr. G. Reuthe, for rock-garden plants.

Flora Medal.

To Messrs. Chaplin Bros., Ltd., for Violas.
To Mr. H. Clarke, for Violas.
To Mr. H. G. Longford, for a mixed group of Tulips and bulbous Irises.
To Mr. Wm. Yandell, for Violas.
To Mr. W. J. Marchant, for trees and shrubs.
To Mr. R. C. Notcutt, for shrubs.
To Mr. Charles Turner, for shrubs.
To Mr. J. C. Allgrove, for a mixed group of shrubs, Eremurus, and herbaceous plants.
To Messrs. R. H. Bath, Ltd., for a mixed group of Tulips, Daffodils, and herbaceous plants.
To Messrs. G. Jackman & Sons, for a mixed group of herbaceous and alpine plants and shrubs.
To Messrs. Lowe & Gibson, for a mixed group of border Carnations, Lilies, etc.
To Messrs. R. Gill & Son, for a mixed group of Rhododendrons, shrubs, and herbaceous plants.
To Messrs. Casburn & Welch, for alpines.

Banksian Medal.

To Mrs. W. R. Dykes, for Irises.
To Messrs. Barr & Sons, for Irises.
To Messrs. Black & Flory, for Orchids.
To Messrs. Stuart Lowe & Co., for Orchids.
To Messrs. G. Gibson & Co., for herbaceous plants, alpines, and dwarf shrubs.
To Messrs. B. Ladhams, Ltd., for hardy plants and shrubs.
To Messrs. Bowell & Skarratt, for shrubs.
To Messrs. Harrods, Ltd., for clipped Box and Bay trees.
To Messrs. J. Cheal & Sons, for Dahlias.

To Messrs. Reamsbottom & Co., for Anemones.
To the Horsecombe Quarries and Stone Works, for a garden.
To Messrs. W. Cutbush & Son, Ltd., for Roses.
To Messrs. John Peed & Son, for stove and greenhouse plants.
To Messrs. Wm. Wood & Son, Ltd., for Primulas.
To the Central Garden Supplies, for plants, dwarf shrubs, and dwarf Conifers for the rock garden.
To Mr. P. Gardner, for alpine plants.
To Mr. H. Hemsley, for rock-garden plants.
To Messrs. Jeans & Trowbridge, for plants and shrubs for the rock garden.
To Messrs. Maxwell & Beale, for rock-garden plants.
To Mr. R. V. Roger, for rock-garden plants.
To Messrs. Wm. Wood & Son, Ltd., for rock-garden plants.
To Mr. G. G. Whitelegg, for dwarf shrubs and rock-garden plants.

Silver-gilt Hogg Medal.

To Messrs. Laxton Bros., for Strawberries.
To the Hon. Sir John Ward (gr. C. Beckett), for fruit.

GENERAL MEETING.

JUNE 5, 1928.

Mr. H. B. MAY, V.M.H., in the Chair.

Four hundred and nine Fellows and eight Associates were elected, and three Societies affiliated.

A lecture on "The Control of the Greenhouse White-Fly" was given by Mr. E. R. Speyer, M.A. (see p. 181).

GENERAL MEETING.

JUNE 19, 1928.

Dr. A. B. RENDLE, M.A., F.R.S., V.P.L.S., V.M.H., in the Chair.

Sixty-three Fellows and one Associate were elected, and one Society affiliated.

A lecture on "Some Features of the Vegetation of Australia, New Zealand, and Tasmania," was given by Dr. A. W. Hill, C.M.G., M.A., F.R.S., F.L.S.

The Pæony Cup, presented by Mrs. Edward Harding, was awarded to Mr. W. B. Cranfield.

THE AMATEURS' FLOWER SHOW.

JUNE 26, 1928.

CHIEF AWARDS.

Silver Cup, for the highest points in Division A.

To Sir William Lawrence, Bt., 37 points.

Silver Cups, for the highest points in Division B.

To Mrs. G. H. Fisher, 21 points } (equal first).
To Mrs. Wightman, 21 points }

Silver Cup, for the highest points in Division C.

To Mr. F. J. Cashnella, 39 points.

MEDALS PRESENTED BY THE NATIONAL SWEET PEA SOCIETY.

Silver-gilt Medal.

To Mr. C. B. Krabbe.

Silver Medal.

To Mr. W. Huffey.

Bronze Medal.

To Mr. G. Holder.

SCIENTIFIC COMMITTEE.

JANUARY 3, 1928.

Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and ten other members present.

Lilac attacked by scale insects.—Mr. Chittenden said that the scale insect attacking the lilac shoots shown at the last meeting had been identified at Wisley as *Chionaspis salicis.*

Botanical Certficate.—On the motion of Mr. Hanbury, seconded by Mr. Bowles, a Botanical Certificate was unanimously recommended to *Odontoglossum Wyattianum* shown by Messrs. Sanders as a new species from Peru.

British Willows.—Mr. J. Fraser showed a series of specimens of *Salix alba vitellina.* The staminate form of this variety is very rare. He had collected it near Twickenham and Mortlake and it is now growing on the banks of the Wey at Pyrford in Surrey. He considered *S. vitellina pendula* a hybrid with the catkin bracts near those of *S. alba.*

SCIENTIFIC COMMITTEE, JANUARY 17, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nine other members present, with Mr. A. Lofthouse (visitor).

Lychnis × intermedia.—Mr. J. Fraser showed specimens of *Lychnis × intermedia,* a plant intermediate between *L. dioica* and *L. alba,* with reddish pink flowers, found in hedges occasionally, *L. dioica* being a shade and *L. alba* a full light plant.

Pollination in Orchards.—Mr. C. H. Hooper suggested a series of experiments designed to ascertain whether the pollen of one variety was more effective than that of another in bringing about fruitfulness in apples (apart from self fertility). He instanced results obtained abroad, based largely on pollen germination tests, and suggested that experiments should be made with bagged flowers in the open. It was pointed out that the scale of the experiments suggested was not sufficiently great to give value to negative evidence and that experiments in the open were attended with great dangers of frustration without apparently any countervailing advantage where a properly constructed orchard house was available.

Swelling on Root of Conifer.—Mr. Preston showed on behalf of Mr. Wood a piece of root of a Cupressus with a large globular swelling upon it. This Mr. Preston took for further examination.

A new Meconopsis.—Mr. A. Lofthouse showed foliage and fruit of a white-flowered Meconopsis which had flowered in his garden last summer. It has persistent winter foliage, almost woolly and stiff. The origin of the seed is uncertain. Mr. Lofthouse also showed photographs of the plant, and these and the specimens were referred to Sir David Prain for his opinion.

SCIENTIFIC COMMITTEE, JANUARY 31, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eleven other members present.

Enation on Cyclamen.—Mr. Van de Weyer showed leaves of *Cyclamen persicum* with large enations, the tissues reversed in position as regards those of the leaves from which the enations sprang. He also showed a picture of *Stapelia grandiflora.*

Trifolium sp Mr. J. Fraser showed a series of dried specimens of the rarer British species of Trifolium.

Swelling in root of Cupressus macrocarpa.—Mr. Preston showed a section through the swollen root of *C. macrocarpa* exhibited at the last meeting and said that it appeared to be similar to those found on the roots of *Pinus sylvestris,* but that no fungus could be found associated with the swelling.

New Parasite of Primulas, etc.—Dr. Rodman showed a series of excellent photographs of a leaf hopper, *Zygine parvula,* which had been doing considerable damage to foliage of Primula, Fuchsia, Calceolaria and Salpiglossis at Kew. The insect is minute and pale green, and so far no repressive measures tried had proved effective.

Meconopsis superba.—Sir David Prain had identified the Meconopsis shown by Mr. A. Lofthouse at the last meeting as *M. superba*, a white flowered species of which this is the first record of flowering under cultivation. It shares with *M. Wallichii* the peculiarity of retaining its foliage through the winter (figs. 96, 97).

SCIENTIFIC COMMITTEE, FEBRUARY 14, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nine other members present, with Mr. Van de Weyer (visitor).

Fruiting of Fatsia japonica.—Mr. Worsley remarked upon the fruiting of *Fatsia japonica* in his garden at Isleworth this year.

Salix lanata.—Mr. Fraser showed dried specimens of *Salia lanata* from wild sources and also *S. lanata* var. *Stuartii* from Wisley, the latter being ♀.

Calibanus caespitosus Rose.—Mr. W. E. Ledger showed a plant of this curious species growing in a pot. It is a liliaceous plant from Mexico, seldom seen in flower. Mr. Ledger said that he had cultivated this plant since December 1906, when it may have been ten or more years old. The flower-spike appeared late last autumn, heralding its presence by bursting the pot! A specimen flowered at Kew a good many years ago, and created a mild sensation at the time, and was called in the press the "monster plant." The genus is named after Shakespeare's Caliban, but there is nothing very "monstrous" about it, except perhaps the root-stock which, in old and large specimens, is rather shapeless and covered with thick bark, recalling the South African 'Elephant's Foot' *Testudinaria elephantipes*, but there is really no resemblance between the two plants. It has been described under a variety of names. The first he traced being *Cordyline longifolia*, Bentham in *Plantas Hartwegianas*, 1839, p. 53. Then as *Dasylirium Hartwegianum* Zuccarini in *Act. Acad. Monac.* **4**, sect. 2, 1845. It was figured in the *Botanical Magazine*, tabl. 5099, under the name of *Dasylirion Hartwegianum* (Zuccarini's name with a slightly modified spelling of the generic name). In *Wuchenschriffverein Gartenrei*, 4, p. 286, 1861, it is described as *Dasylirion caespitosum* Scheidweiter. Lemaire described it as *Dasylirion Hookeri* in *La Belgique Horticole*, **15**, p. 324, 1865, and then Mr. J. G. Baker gave it the name of *Beaucarnea Hookeri* in the *Journal of Botany*, 1872, p. 327. One may assume that lack of material, particularly of inflorescence, fruit, and seed, accounts for the want of unanimity among the foregoing botanists, but finally, in *Contributions from the United States National Herbarium*, 1906, p. 90, with two plates, Rose published it as *Calibanus* (*genus novum*), retaining the specific name *caespitosus* of Scheidweiter. Rose there states that it is nearest *Nolina*, but differs greatly in its habit and in its globular thick-walled one-seeded fruit. It is very different alike in habit, inflorescence, and fruit from *Dasylirion* to which it has long been referred. Its globular trunk suggests *Beaucarnea*, in which it is placed by Baker, but its fruit excludes it from that genus. As to the plant's habitat, Zuccarini's *Dasylirium Hartwegianum* was sent from Zacatecas in Mexico. The plant figured in the *Botanical Magazine* was received from Mr. Repper, of the Real del Monte Co.'s establishment in Mexico. Mr. Rose's material came from San Luis Potosi, near the city of San Luis Potosi in 1903 (trunk only), and in 1905 numerous plants but no flowers. In 1905 he also received specimens from Hidalgo, near Ixmiquilpan, with male and female flowers and immature fruit, and from Dr. C. A. Purpus at the same date and place, and also later—in fruit. Mr. Ledger's plant, which he received from Sprenger, of Naples, in December 1906, may possibly have been one of these.

SCIENTIFIC COMMITTEE, FEBRUARY 28, 1928.

Mr. A. WORSLEY in the Chair, and seven other members present, with Mr. Van de Weyer (visitor).

Mentha sp.—Mr. Fraser showed a new variety of *Mentha verticillata*, which he had named *congesta*, and described its characteristics and relationships. Several specimens, mainly from Surrey, including Dorking and Newdigate, were shown.

Gall on Hawthorn.—Galls produced by the attacks of Cecidomyia on the terminal buds of hawthorn, checking growth, were sent by Lady Stanley.

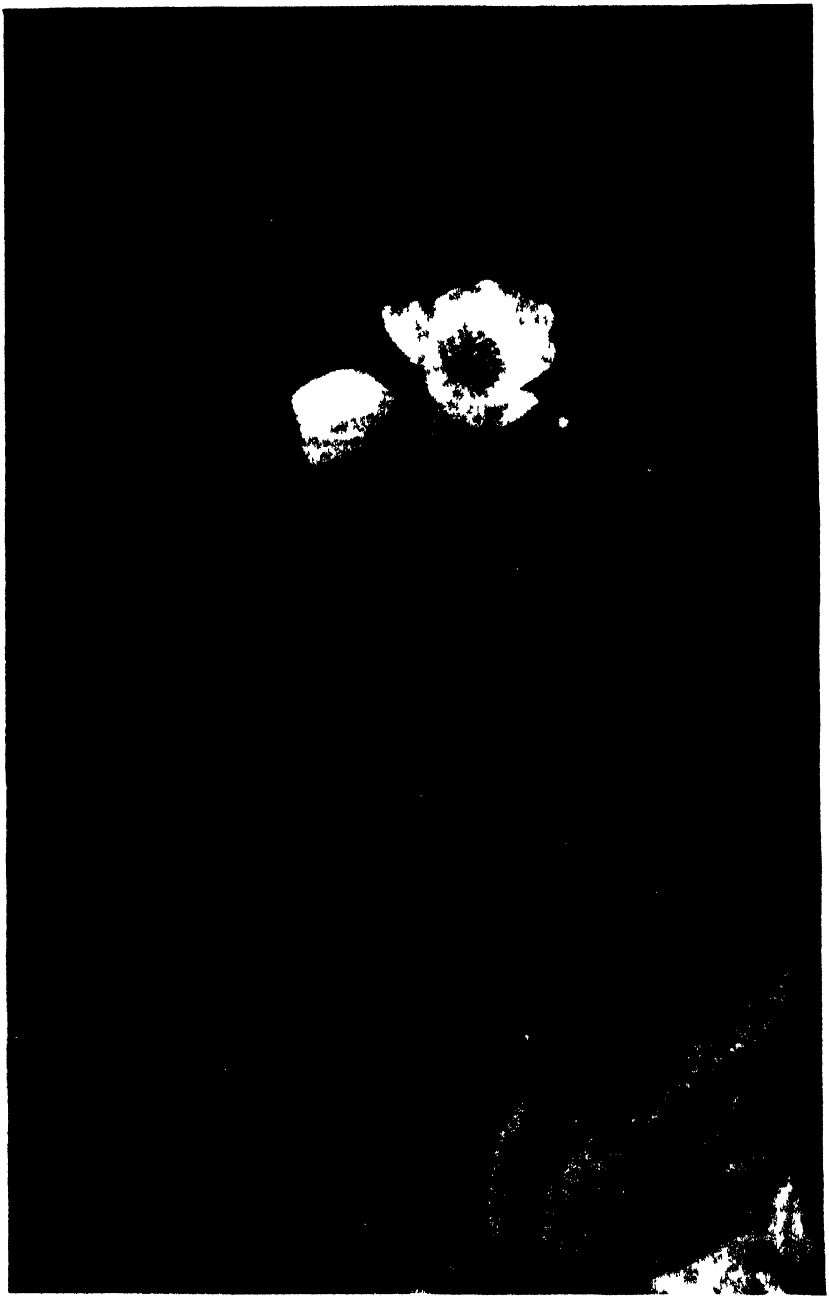


FIG. 96.—MECONOPSIS SUPERBA

To face p. xxxii

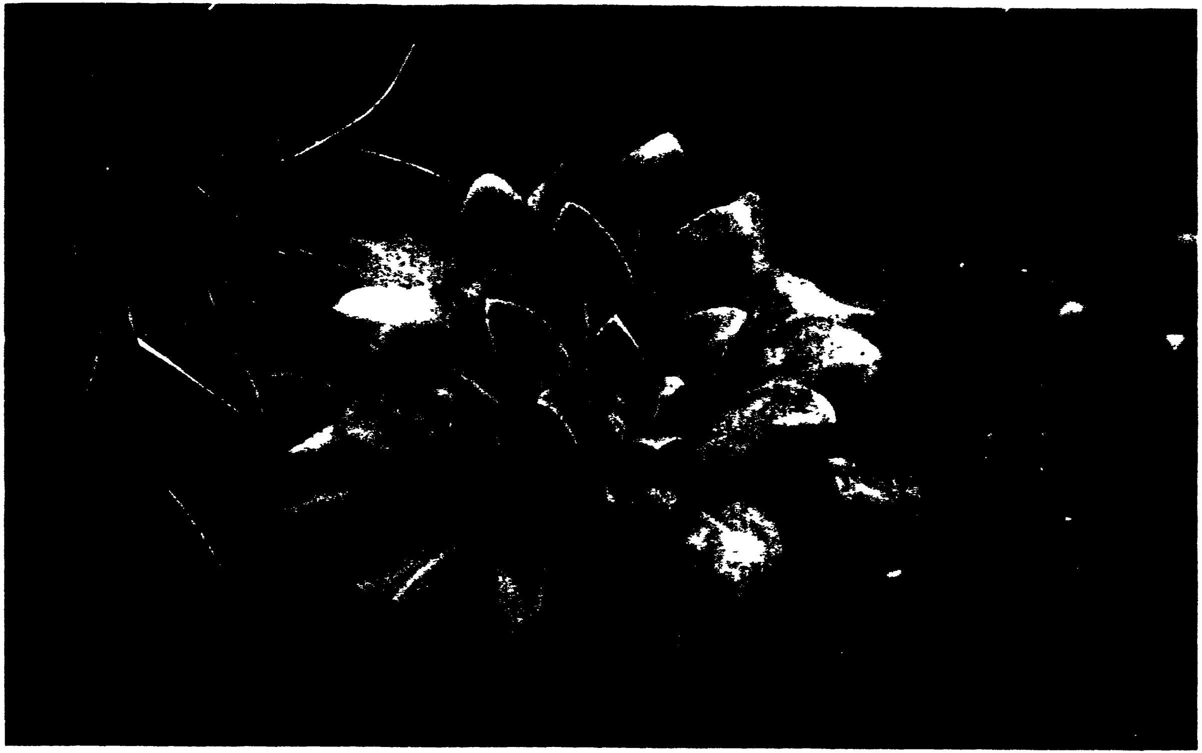
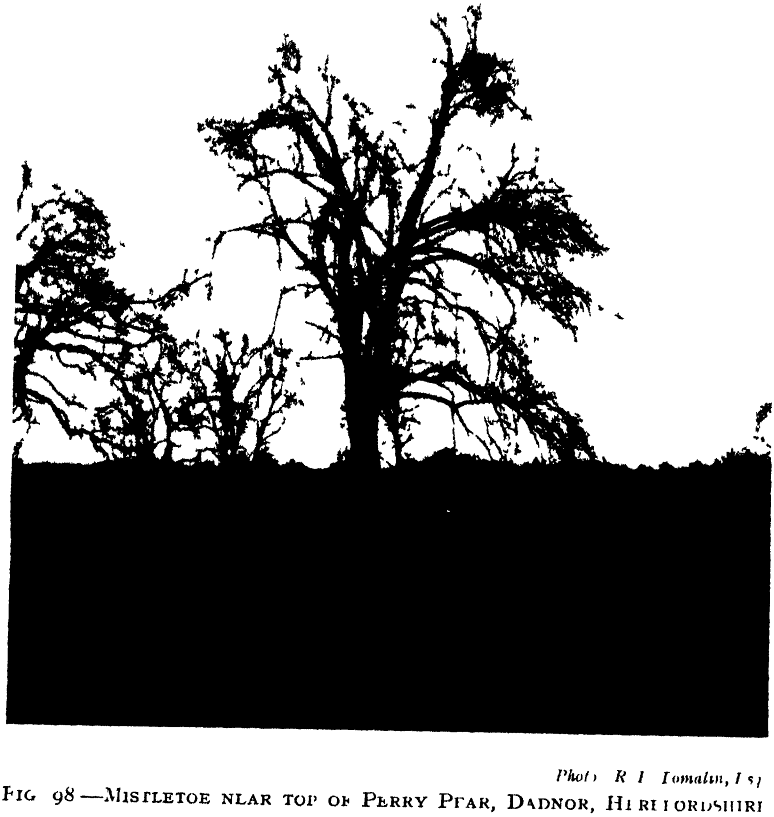


FIG 97 —MECONOPSIS SUPERBA—WINTER ROSETTE.



Photo, R. F. Tomalin, Esq.

FIG. 98.—MISTLETOE NEAR TOP OF PERRY PEAR, DADNOR, HEREFORDSHIRE.

[*To face p.* xxxiii.

Primula × *kewensis dialysed.*—Mr. Mark Hills of Coombe House Gardens, Croydon, sent a plant of *Primula kewensis* having the corolla divided to the base so that the segments were almost free. The plant, which was a seedling raised by Mr. Mills, had behaved in the same way last year.

SCIENTIFIC COMMITTEE, MARCH 13, 1928.

Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and eleven other members present.

Catasetum sp.—An uncommon species of Catasetum shown before the Orchid Committee by Messrs. Charlesworth was taken by Mr. Cotton for naming.

Diseased bulbs.—Mr. Marsden Jones showed a number of bulbs of daffodil, Scilla, crocus and tulip which had failed on a particular site in a garden near Devizes. The cause of failure was probably something amiss with the soil.

British Plants.—Mr. J. Fraser showed dried specimens of *Papaver hybridum, Roemeria hybrida, Trifolium procumbens* and *T. agrarium.*

SCIENTIFIC COMMITTEE, MARCH 27, 1928.

Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and ten other members present.

Plants for identification.—Sir David Prain showed at the previous meeting photographs of a plant much used in Hong Kong for forcing. It has now been identified as *Enkianthus quinqueflorus.* The Catasetum referred to Kew for identification proved to be *C. Christyanum.*

Tulipa stellata.—Lady Lowndes sent a pan of a very pretty Tulip collected in Kashmir with flowers coloured like those of *C. Clusiana* outside but lacking the purple base within and having glabrous filaments. It is undoubtedly *T. stellata,* a species rarely seen in England.

Tulips with coloured leaves on scape.—Mr. Worsdell showed a Darwin Tulip with leaves springing from the scape, green in the middle and edged red.

Rosa sp.—Mr. Fraser showed several specimens of the Scotch roses, *R. coriifolia incana* and *pruinosa* or closely related forms, *R. mollis* and its varieties *coerulea* and *glandulosa,* and a small fruited variety of *R. tomentosa.* He remarked upon the difficulty of exactly matching the wild plants with the published descriptions.

Anemone fulgens, etc.—Mr. Bowles showed drawings he had made in South France recently of hybrids found there between *A. Pavonina* and *A. stellata.* They have been found growing about the edges of fields and latterly have been grown for market. *A. stellata* grows there in the grass. He said also that *A. fulgens* (which apparently rarely seeds in nature) when raised from seed produces forms closely similar to those of the hybrids of which he showed drawings. He therefore concluded that *A. fulgens* was in all probability a hybrid.

Primrose aberrations.—Miss Moutray Read sent an example of a pink hose-in-hose Polyanthus and a variegated leaf found in a primrose.

SCIENTIFIC COMMITTEE, APRIL 11, 1928.

Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and nine other members present.

Kalanchoe sp.—Mr. Cotton reported that Mr. N. E. Brown considered the Kalanchoe shown by Sir William Lawrence at the last meeting to be near *Kalanchoe Kirkii,* but perhaps a new species.

Catasetum sp.—Messrs. Charlesworth exhibited a species of *Catasetum* which was reserved for further examination.

Tulipa chrysantha.—Mr. Hay showed a pretty species of Tulipa, *T. chrysantha,* from Kashmir for which, on the recommendation of Mr. Bowles, seconded by Mr. Hanbury, a Botanical Certificate was unanimously recommended.

Primula × *Tess.*—Mr. Hosking showed a cross between *P. Juliae* and a hose-in hose Polyanthus which exhibited the hose-in-hose form of the Polyanthus.

Mistletoe on Pinus sylvestris.—Mr. Preston reported the germination of seeds of the common Mistletoe on *Pinus sylvestris* at the Cambridge Botanic Garden.

British Violas.—Mr. Fraser showed dried specimens of *V. lutea amoena* from Killin, *V. lutea multicaulis* from Glen Lochray, *V. lutea Pesneaui* from North Aberdeen and *V. nana* from Corbière.

SCIENTIFIC COMMITTEE, APRIL 24, 1928.

Mr. WORSLEY in the Chair, and six other members present.

Matthiola, native species.—Mr. J. Fraser showed dried specimens of *Matthiola incana* from cliffs near Brighton and *M. sinuata* from Pembroke and Jersey. He suggested that the extreme hoariness of *M. sinuata* had rendered it more difficult of cultivation than *M. incana* and on this account it had played no part in the development of the Garden Stock.

Mentha varieties.—Mr. Fraser also showed a form of *Mentha arvensis hirtipes* with whorls of three leaves and remarked that in only one other mint—*M. rotundifolia* × *viridis*—had he seen this to occur.

Turf defective.—Dr. Voelcker showed examples of turf from a bowling green and some discussion took place regarding the cause of the defective patches.

SCIENTIFIC COMMITTEE, MAY 8, 1928.

Mr. A. D. COTTON, F.L.S., in the Chair, and four other members present.

Mentha Pulegium.—Mr. J. Fraser showed herbarium specimens of *Mentha Pulegium* from several localities.

Oxalis gigantea.—Mr. Clarence Elliott sent a specimen under the name of *Oxalis gigantea* collected in North Chile, with the following note: "I found this plant at Cuquimbo in North Chile, where it was very plentiful on hot hillsides. It made a bush anything up to 6 and 7 ft. high. Seed was sent home which has germinated in several gardens. I also sent home a plant which is now exhibited for its botanical interest. The flowers are bright yellow. Cattle eat the young shoots of this plant. I have also brought up a piece of the wood of this curious Oxalis which, however, is not by any means the greatest thickness to which it attains. I have seen a trunk as much as 3 inches in diameter. It is most unlikely that it will ever become a popular greenhouse plant, although when growing wild it is distinctly pretty with the branches a mass of yellow blossoms from top to bottom."

SCIENTIFIC COMMITTEE, JUNE 5, 1928.

Professor H. E. ARMSTRONG, F.R.S., in the Chair, seven other members and Mr. VAN DE WEYER (visitor) present.

Nerium Oleander var.—Mr. W. Ledger showed a deep-coloured form of *Nerium* Oleander from Como, Italy, given him by the late Mr. J. T. Bennett-Poe, after whom he desired to name the variety.

Salix pentandra.—Mr. J. Fraser showed dry specimens of *Salix pentandra* from various localities to illustrate the variable width of its foliage.

Mistletoe on Pear.—Miss E. Armitage sent a photograph taken by Mr. R. F. Tomalin in a perry orchard at Dadnor, Herefordshire, in April 1928 (fig. 98). The plant was first noticed in 1925 and has increased considerably in size since. When Dr. Bull in 1863 wrote his paper on the "Mistletoe in Herefordshire," only five plants of mistletoe were known on pear in the county, in the thousands of orchards that existed there, and no recent records had come to Miss Armitage's notice.

Cypriantha cretica.—Mr. G. P. Baker showed specimens of the fine white *Cypriantha cretica.*

SCIENTIFIC COMMITTEE, JUNE 27, 1928.

Sir DAVID PRAIN, F.R.S., in the Chair, and seven other members present.

Oxalis gigantea ?—Mr. Preston said the plant shown by Mr. Clarence Elliott at the last meeting was not *Oxalis gigantea.* Miss Saunders, who is investigating the species of this genus, will later send the correct name.

Galls on Lime.—Mr. G. W. E. Loder showed lime leaves bearing the red nail-like galls caused by the gall mite, *Eriophyes tiliae.*

Chlorosis.—Mr. Odell drew attention to the chlorotic condition of much of the foliage of trees on the chalky soil near Newmarket this year. This condition appears to be due to the inability of the plants to obtain sufficient iron.

Pyrus Aria incisa.—Mr. Fraser brought specimens of the foliage of this plant to illustrate the variations met with in it.

Aponogeton abysinnicum.—Mr. Amos Perry showed a plant under this name and the Award of a Botanical Certificate was unanimously recommended, subject to the correctness of the name.

Cremanthodium sp.—Mr. Scrase Dickins showed a specimen of a Cremanthodium which was referred to Dr. A. B. Rendle for identification.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 3, 1928.

Mr. H. S. RIVERS in the Chair, and twelve other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for vegetables.

Silver-gilt Hogg Medal.

To Messrs. Cheal, Crawley, for collection of Apples.

Award of Merit.

To Apple 'Saltcote Pippin' (votes unanimous), from Mr. F. H. Chapman Rye. This new apple is of medium size, sometimes a little large, conical or rounded in shape and of good appearance. The colour is dull brownish red or yellow, blotched and striped with crimson; with a faint network of russet over parts of the skin. The eye is closed in an even, moderately deep, broad, and slightly puckered basin, and the stem is of medium length, just protruding from a deep and rather narrow cavity. The flesh is yellow, firm, very juicy and finely flavoured. The variety is a vigorous grower and is reported to crop very freely. It should prove a useful dessert apple for use in November, December, and into January.

Other Exhibits.

Miss D. Carter, Peasmarsh : preserves.
Mrs. Fleming, Uxbridge : preserves.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 17, 1928.

Mr. P. C. M. VEITCH, V.M.H., in the Chair, and eleven other members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. Sutton, Reading, for vegetables.

Award of Merit.

To Apple 'High View Pippin' (votes unanimous), from Mr. E. Hill, Oatlands Drive, Weybridge (gr. Mr. Fitzwilliam). This apple is small, conical and tapering to the eye: the average size of specimens exhibited being two inches high by one inch broad. The colour is rich golden yellow faintly orange flushed on the sunny side, with fine russety network over the skin, which is a little rough. The eye is closed in a broad, shallow and slightly puckered basin and the stem is short, and woody, set in a narrow deep cavity that is lined with russet. The flesh is firm, white, crisp and very juicy. Of very good flavour; sweet. The variety is said to be of moderate vigour and very fertile. A very good, small dessert apple for use in January and February.

Other Exhibits.

Messrs. Bunyard, Maidstone: collection of Apples in season.
Messrs. Stevens, Sidmouth: Apple 'Woolbrook Russet.'
Mr. L. C. P. Rich, Northwood: Pine 'Smooth Cayenne.'
Miss D. Carter, Peasmarsh: preserves.
Miss H. Sewell, S. Kensington: preserves.
Mrs. Fleming, Uxbridge: preserves.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 31, 1928.

Mr. A. H. PEARSON, V.M.H., in the Chair, and eleven other members present.

Awards Recommended :—

Silver-gilt Hogg Medal.

To Messrs. Bunyard, Maidstone, for collection of Apples.

Apple 'Woolbrook Russet,' sent by Messrs. Stevens, Sidmouth, was recommended for inclusion in the Commercial Fruit Trials at Wisley.

Other Exhibits.

Mr. F. Pryke, Bury St. Edmunds : seedling Apple.
Mrs. Bird, W. Wickham : Apple 'Wickham Pippin.'
L.M.S. Rly., Horticultural Society, Derby : seedling Apple.
Miss D. Carter, Peasmarsh : preserves.
Miss H. Sewell, S. Kensington : preserves.
Mrs. Fleming, Uxbridge : preserves.
Pickering Cottage Preserves, Loose : preserves.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 14, 1928.

Mr. A. H. PEARSON, V.M.H., in the Chair, and twenty-two other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for vegetables.

Silver-gilt Hogg Medal.

To Messrs. Rivers, Sawbridgeworth, for collection of Citrus.

Apple 'King George V,' sent by Messrs. Cheal, Crawley. It was recommended that a deputation be sent to see trees of this variety growing in the nursery, in summer, with a view to recommending an Award of Merit.

Other Exhibits.

Messrs. Dobbie, Edinburgh : Potatos.
Messrs. Cheal, Crawley : Apples.
Messrs. Bunyard, Maidstone : Apples in season.
Mr. A. E. Burgess, Horticultural Superintendent, Surrey C.C. : boxes of Apple 'Cox's Orange Pippin,' demonstrating the value of oiled paper wraps for apples in store.
Mr. P. C. M. Veitch, V.M.H., Exeter : Apple 'Opalescent.'

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 28, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and thirteen other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. E. Dormer, High Wycombe : seedling Apple.
Mr. E. A. Bunyard, Maidstone : Claytonia perfoliata.

FRUIT AND VEGETABLE COMMITTEE, MARCH 13, 1928.

Mr. W. POUPART, V.M.H., in the Chair, and thirteen other members present.

Award Recommended :—

Gold Medal.

To Messrs. Allgrove, Langley, for collection of Apples.

FRUIT AND VEGETABLE COMMITTEE, MARCH 27, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and twenty other members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Veitch, Exeter: Apples.
Mrs. E. L. Eady, Southampton: Nectarines 'Edith Eady' and 'Louise Eady.'
Mr. W. T. Clapson, St. Leonards-on-Sea: Apple 'Green Gage Pippin.'
Mr. R. Hall, Hatfield: Apple 'Newton Wonder.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 11, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and five other members present.

There was no business before the Committee on this occasion.

FRUIT AND VEGETABLE COMMITTEE, APRIL 24, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and twelve other members present.

No awards were recommended on this occasion.

Exhibit.

Col. Howard Bury, M.P., Mullingan, Ireland: fruit of Cyphomandra betaceæ.

FRUIT AND VEGETABLE COMMITTEE, MAY 8, 1928.

Mr. C. G. A. Nix, V.M H., in the Chair, and twelve other members present.

It was recommended that seed of the Savoy (unnamed), exhibited by Mr. F. N. Roberts, Scarborough, should be sent for growing in the next trial at Wisley

Exhibit.

Hon. Vicary Gibbs, Aldenham: Rhubarb 'The Streeter.'

FRUIT AND VEGETABLE COMMITTEE, MAY 23, 1928.

AT CHELSEA SHOW.

Mr. J. CHEAL, V.M.H., in the Chair, and twenty-one other members present.

There was no business before the Committee on this occasion.

FRUIT AND VEGETABLE COMMITTEE, JUNE 5, 1928.

Mr. W. POUPART, V.M.H., in the Chair, and eleven other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. H. Reams, Shirbeck: seedling Apple.
Mr. H. Wigley, Gravesend: Apple for opinion.

FRUIT AND VEGETABLE COMMITTEE, JUNE 19, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and nine other members present.

There was no business before the Committee on this occasion.

FLORAL COMMITTEE.

JANUARY 3, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Engelmann, Saffron Walden, for Carnations.

Other Exhibit.

Messrs. S. Low, Enfield : Carnations and other greenhouse plants.

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and ten other members present.

Award Recommended :—

Award of Merit.

To *Callicarpa rubella* (votes unanimous), from Lionel de Rothschild, Esq., Exbury. This was collected by Farrer and shown under his number 1446. It is a Chinese shrub with slender, arching stems bearing opposite, ovate-oblong, toothed leaves, tomentose beneath. The dense clusters of pinkish flowers are succeeded by numerous small, brilliant violet fruits. Unfortunately this species is not sufficiently hardy to be widely grown in the open.

FLORAL COMMITTEE, JANUARY 17, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Cyclamen.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Carter, Raynes Park, for Hyacinths, Primulas and Irises.
To Messrs. Sutton, Reading, for Primulas.

Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. S. Low, Enfield, for Carnations
To Mr. H. Woolman, Birmingham, for Chrysanthemums.

Award of Merit.

To Chrysanthemum ' Crimson Conquest ' (votes unanimous), from Mr. H. Woolman, Birmingham. A medium-sized Japanese decorative variety with flattish, broad, pointed florets of a bright crimson colour which is very welcome at this season. It is a useful variety for cutting and market

To *Primula sinensis* double 'Sutton's Purity' (votes 14 for), from Messrs. Sutton, Reading. A good pure white double Primula suitable for pot cultivation in a cool greenhouse. The flowers are borne well above the foliage, and the variety comes quite true from seed.

Other Exhibits.

Mr. G. Carpenter, Byfleet: Carnation 'L. L. Taylor.'
Messrs. Gill, Falmouth: Anemones.
Sir John F. Ramsden, Bt., Gerrard's Cross: Calla 'Byram Giant.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, sixteen other members and Mr. A. W. Exell (visitor) present.

Awards Recommended:—

Banksian Medal.

To Messrs. Barr, Taplow, for bulbous plants.
To Messrs. Cutbush, Barnet, for rock garden.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. Low, Enfield, for shrubs.
To Messrs. Russell, Richmond, for shrubs.

Award of Merit.

To *Chimonanthus fragrans* var. *grandiflorus* (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A desirable shrub which is generally supposed not to flower freely. The branches shown on this occasion were well covered with blossom. It is a deciduous shrub with elliptic-ovate leaves 3–5 inches long. The flowers are produced in December and January and are deliciously fragrant. The outer segments are pale yellow, the inner ones striped with purplish-brown.

Other Exhibits.

The Misses Hopkins, Coulsdon: rock plants.
Mr. J. J. Klinkert, Richmond: clipped trees.
Sir John Ramsden, Bt., Gerrard's Cross: *Saurauja macrosticha.*
Mr. F. G. Wood, Ashtead: shrubs and alpine plants.
Messrs. Wm. Wood & Son, Taplow: rock plants.

FLORAL COMMITTEE, JANUARY 31, 1928.

Section A.

Mr. H. B. May, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Sutton, Reading, or flowering bulbs.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Carter, Raynes Park, for Daffodils and *Primula malacoides.*
To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.

Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

Other Exhibits.

Messrs. Gill, Falmouth: Anemones.
W. Van de Weyer, Esq., Dorchester: Chrysanthemum 'Clyffe Pink.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs and alpine plants.

Banksian Medal.

To Messrs. Barr & Son, Taplow, for shrubs and alpine plants.
To Messrs. Cutbush, Barnet, for rock garden.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. Russell, Richmond, for shrubs.
To Messrs. Waterer, Taplow, for shrubs and alpine plants.
To Messrs. Wood & Son, Taplow, for shrubs and alpine plants.

Award of Merit.

To *Rhodora canadensis* (votes 9 for, 3 against), from Messrs. Cheal, Crawley. Often called *Rhododendron Rhodora*, this is a deciduous shrub reaching a height of four or five feet. The flowers are small, bright rosy-purple, and are produced in April (in the open) in small terminal clusters on leafless twigs. A handsome plant for moist, semi-shaded positions.

To *Strobilanthes isophyllus* (votes 6 for, 3 against), from Sir Wm. Lawrence, Bt., Burford. A greenhouse flowering plant with leafy, spreading stems 8 to 10 inches in height. The decussate leaves are 4 to 5 inches long, linear-lanceolate, obscurely serrate, and dark olive-green. The flowers are produced in short, axillary clusters and are tubular, expanded at the throat, 1 inch long. Their colour is pale lilac, except for faint red stripes in the throat.

Other Exhibits.

Miss G. Howse, Golder's Green : miniature garden.
Mr. J. J. Klinkert, Richmond : clipped trees.
Sir Frederick Moore, Rathfarnham : *Rhododendron Shepherdii.*
Messrs. Pulham, Bishop's Stortford : shrubs and rock plants.
Captain R. D. Trotter, Ockley : *Cyclamen Coum*, Glasnevin var.
Mr. F. G. Wood, Ashtead : shrubs and alpine plants.

FLORAL COMMITTEE, FEBRUARY 14, 1928.

Section A.

Mr. H. B. May, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Blackmore & Langdon, Bath, for Cyclamen.

Banksian Medal.

To Messrs. Cuthbert, Southgate, for Freesias.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.
To Rev. H. R. Meyer, Watton, for Iris ' Cantab.'
To Mr. G. Prince, Oxford, for Roses.
To Messrs. Sutton, Reading, for Crocuses.

Award of Merit.

To *Primula stellata* ' Hillside Blue ' for growing in pots in a cool greenhouse (votes 12 for), from L. Sutton, Esq., C.B.E., J.P. (gr. Mr. T. Townsend), Reading. A very floriferous variety having evenly serrated foliage and whorls of large bright violet-blue flowers with a pale green eye.

Other Exhibits.

Messrs. Dutton, Iver: Carnation 'Mrs. A. J. Cobb,' A.M. April 5, 1927.
Miss E. Heathcote, Williton: Violets.
Mr. B. Pinney, Shipbourne: Violets.
Messrs. Redgrove, Borough Green: *Primula malacoides* 'West Kent Beauty.'
Messrs. Sutton, Reading: Primulas Nos. 355 and 356 (*P. obconica* × *P. sinensis*).

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and twenty other members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Barr, Taplow, for alpine plants and shrubs.
To Messrs. Cheal, Crawley, for alpine plants and shrubs.
To Mr. G. Reuthe, Keston, for alpine plants and shrubs.

Banksian Medal.

To Messrs. Casburn & Welch, Cambridge, for alpine plants.
To Messrs. Cutbush, Barnet, for rock garden and shrubs.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. Jeans & Trowbridge, West Moors, for alpine plants.
To Messrs. Prichard, Christchurch, for alpine plants.
To Messrs. Russell, Richmond, for flowering shrubs.
To Messrs. Veitch, Exeter, for flowering shrubs.
To Messrs. Waterer, Twyford, for shrubs and alpine plants.
To Mr. F. G. Wood, Ashtead, for alpine plants.
To Messrs. Wood, Taplow, for alpine plants.

Award of Merit.

To *Camellia rosaeflora flore pleno* as a tender flowering shrub (votes unanimous), from the Director, Royal Botanic Gardens, Kew. A pleasing variety, bearing double, blush-pink flowers between 2 and 3 inches in diameter. The leaves are dark green and glossy.

To *Colchicum luteum* as a hardy flowering bulb (votes unanimous), from T. Hay, Esq., Hyde Park. This is the only yellow-flowered species known, and is rare in cultivation. The leaves and small, bright golden flowers are produced together in February. *C. luteum* grows wild in mountains of North-West India.

To *Excoecaria bicolor* as an ornamental-foliaged shrub for the greenhouse (votes 11 for, 4 against), from Viscountess Byng of Vimy, Thorpe-le-Soken. An ornamental, tropical shrub with opposite, elliptical leaves 3–4 inches long. The leaves are rich green above and purplish-red beneath. The small, greenish flowers are inconspicuous.

To *Leptospermum scoparium roseum* as a flowering shrub, hardy in south-western counties (votes unanimous), from the Rev. A. T. Boscawen, Ludgvan. This is a very desirable variety of the well-known *L. scoparium*. The foliage is greyish-green and the flowers nearly an inch across, in colour soft rose-pink, with dark centres.

To *Leptospermum scoparium roseum multipetalum* as a flowering shrub, hardy in south-western counties (votes 10 for, 1 against), from the Rev. A. T. Boscawen and Messrs. R. Veitch & Son. This is an interesting form of the preceding, in which the centre of the flower is occupied by petaloid stamens. The colour is paler than in *L. scoparium roseum*, than which the present plant is perhaps less attractive.

To *Saxifraga Burseriana* 'Brookside' as a hardy flowering plant for the rock garden and alpine house (votes unanimous), from Messrs. Tucker, Oxford. This variety bears large, well-rounded flowers of pure white on pink stalks 3 inches high. It is a free-flowering plant of neat habit, a little less vigorous than the well-known variety 'Gloria.'

Other Exhibits.

R. Bevan, Esq., Henley-on-Thames: *Saxifraga Burseriana* 'Gloria.'
The Misses Hopkins, Coulsdon: rock plants.
Sir Wm. Lawrence, Bt., Burford: *Brillantaisia owarensis*, *Burchellia capensis*, *Damnacanthus indicus*.
Messrs. Prichard, Christchurch: *Saxifraga* 'His Majesty.'

FLORAL COMMITTEE, FEBRUARY 28, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and seventeen other members present

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Cinerarias.
To Messrs. Sutton, Reading, for Cyclamen.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To L. G. Sutton, Esq. (gr. Mr. F. Townsend), Reading, for *Primula malacoides* varieties.
To the Duke of Wellington (gr. Mr. H. J. Beckingham), Basingstoke, for greenhouse plants.

Banksian Medal.

To Mr. G. H. Dalrymple, Bartley, for Freesias.
To Miss E. Heathcote, Williton, for Violets.
To Messrs. S. Low, Enfield, for Carnations.
To Rev. H. R. Meyer, Watton, for *Iris reticulata*.
To Mr. G. Prince, Oxford, for Roses.

Award of Merit.

To *Primula malacoides* 'Rosalind' as a cool greenhouse pot plant (votes unanimous), from L. G. Sutton, Esq., Reading. A very floriferous variety with many whorls of large rosy-mauve flowers with prominent pale primrose centres The height of the plant is from 1 foot to 18 inches.

Other Exhibits.

Misses Allen-Brown, Henfield : Violets.
Messrs. Dutton, Iver : Carnations.
Messrs. Engelmann, Saffron Walden : Carnations.
Mr. B. Pinney, Shipbourne : Violets.

Section B.

Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. C. Elliott & Co., Stevenage, for alpine plants.

Silver Banksian Medal.

To Messrs. Casburn & Welch, Cambridge, for alpine plants.
To C. Kirch, Esq., Beckenham, for alpine plants.
To Messrs. Prichard, Christchurch, for alpine plants and shrubs.
To Messrs. Russell, Richmond, for flowering shrubs.

Banksian Medal.

To Mr. E. Ballard, Colwall, for Anemones.
To Messrs. Cheal, Crawley, for alpine plants.
To Messrs. Cutbush, Barnet, for rock garden.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. Jeans & Trowbridge, West Moors, for alpine plants.
To Mr. Gavin Jones, Letchworth, for alpine plants.
To Mr. G. Reuthe, Keston, for alpine plants.
To Messrs. Tucker, Oxford, for alpine plants.
To Messrs. Waterer, Twyford, for alpine plants.
To Mr. F. G. Wood, Ashtead, for alpine plants and shrubs.
To Messrs. Wm. Wood & Sons, Taplow, for alpine plants and shrubs.

Award of Merit.

To *Rhododendron arboreum nigrescens* as a hardy flowering shrub (votes unanimous), from Mr. G. Reuthe, Keston. This is said to be a form of the blood-red *R. arboreum rubrum*, found in the Himalayas. The present plant bears large, close trusses of deep crimson, tubular blossoms.

To *Rhododendron* 'Kernick Gem' as a hardy flowering shrub (votes 10 for, 3 against), from Messrs. R. Gill & Son, Falmouth. A hybrid raised from the cross *R. barbatum* × *R. Luscombei*. The trusses are large and shapely: the individual flowers of good size, opening widely at the mouth, rich pink in colour and with spots of a deeper colour on the lower segments.

To *Saxifraga* 'Delia' as a hardy flowering plant for the rock garden and alpine house (votes 10 for), from Messrs. Prichard, Christchurch. This is one of the charming *lilacina* × *Godroneana* hybrids. The hirsute flower-stalks rise from small rosettes of heavily encrusted leaves, each bearing two or three flowers of deep mauve-pink, the colour being somewhat less intense at the margins of the petals.

Other Exhibits.

Mr. E. Ballard, Colwall: *Hepatica triloba* 'Colwall.'
The Curator, Botanic Garden, Cambridge: *Prunus cantabrigiensis.*
Mark Fenwick, Esq., Stow-on-the-Wold: Saxifrages, *Primula Allionii.*
Messrs. Gill, Falmouth: *Rhododendron* 'Springtime.'
Misses Hopkins, Coulsdon: rock plants.
Messrs. Low, Enfield: shrubs.
Mr. M. E. Mills, Croydon: *Saxifraga Burseriana* 'Mrs. W. H. Garwood.'
Messrs. Prichard, Christchurch: Saxifragas.
Messrs. Pulham, Bishop's Stortford: alpine plants and shrubs.
W. Van de Weyer, Esq., Dorchester: *Cyclamen sp.*
Dr. A. H. Williams, Horsham: *Pomaderris elliptica.*

FLORAL COMMITTEE, MARCH 13, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Carter, Raynes Park, for Hyacinths.
To Mr. J. W. Forsyth, Putteridge, for Cyclamen.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mrs. Bucknall, Doneraile, for Anemones.
To Mr. G. H. Dalrymple, Bartley, for Freesias.
To Mr. E. J. Hicks, Hurst, for Roses.

Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. Low, Enfield, for Carnations.
To Mr. G. W. Miller, Wisbech, for Primroses.
To Mr. G. Prince, Oxford, for Roses.

Award of Merit.

To Freesia 'Albâtre' as a variety for cutting (votes 19 for), from Messrs. C. G. van Tubergen, Haarlem, Holland. A large, well-formed, rounded white variety with a yellow blotch in the throat.

To Freesia 'Delight' as a variety for cutting (votes 12 for), from Messrs. C. G. van Tubergen, Haarlem. A very pleasing variety with large whitish flowers having a broad rosy-mauve margin and a small yellow blotch in the throat.

To Hippeastrum 'Cerise Magnificum' as a cool greenhouse pot plant (votes unanimous), from Baron B. Schröder (gr. Mr E. J. Henderson), Englefield Green. This variety resulted from a cross between a 1910 seedling and Hippeastrum 'Ivanhoe.' It has magnificent large flowers of a vivid rich cerise colour.

Selected for trial at Wisley.

Dwarf Crimean Irises 'Orange Queen' and 'Standard,' from Messrs. Barr, Taplow.

Other Exhibits.

Messrs. Dutton, Iver: Carnations.
Mrs. Hubbard, Betchworth: Carnation 'Mrs. Hubbard.'
Messrs. Luxford, Sawbridgeworth: Carnations.
M. Mills, Esq., Croydon: *Primula kewensis* 'Mark Mills.'
Mr. B. Pinney, Shipbourne: Violets.
Messrs. Prichard, Christchurch: *Primula* 'Riverslea.'
Messrs. L. R. Russell, Richmond: Clematis 'Queen Souriya.'
Messrs. Stewart, Wimborne: Hyacinths.

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Lionel de Rothschild, Esq., Exbury, for Rhododendrons.

Silver Banksian Medal.

To Messrs. Cutbush, Barnet, for rock garden and shrubs.
To Messrs. Elliott, Stevenage, for rock garden.
To Messrs. Prichard, Christchurch, for alpine plants.
To Mr. G. Reuthe, Keston, for alpine plants and shrubs.
To Messrs. Russell, Richmond, for Rhododendrons and Clematis.

Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs and alpine plants.
To Messrs. Gill, Falmouth, for Rhododendrons and Camellias.
To Messrs. Hillier, Winchester, for shrubs.
To Messrs. Hodson, Nottingham, for shrubs and alpine plants.
To Miss G. Howse, Golder's Green, for miniature gardens.
To Messrs. Low, Enfield, for Australian shrubs.
To Messrs. Rogers, Southampton, for alpine plants.
To Messrs. Stewart, Ferndown, for alpine plants.
To Messrs. Veitch, Exeter, for shrubs.
To Messrs. Waterer, Twyford, for shrubs and alpine plants.
To Mr. F. G. Wood, Ashtead, for alpine plants.
To Messrs. Wm. Wood, Taplow, for shrubs and alpine plants.

Award of Merit.

To *Cassiope selaginoides* as a dwarf flowering shrub for the rock garden (votes 12 for, 1 against), from Lt.-Col. L. C. R. Messel, Handcross. A miniature shrub with erect stems completely covered with small, deep green, bristle-tipped leaves arranged in four ranks. The flowers are borne singly in the axils of the upper leaves. They are bell-shaped, deeply 5-lobed, white, borne on red-tinted, downy pedicels 1 inch in length.

To *Chionodoxa nana* as a hardy flowering bulb (votes 12 for, 1 against), from G. P. Baker, Esq., Sevenoaks. An uncommon species from Crete with white or pale bluish flowers. As a plant for garden decoration, *C. nana* would appear to be of far less value than the beautiful, though common, *C. Luciliae.*

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant: *Rhododendron* 'Cornsutch.'

G. P. Baker, Esq., Sevenoaks: *Chionodoxa cretica.*

Messrs. Baker, Wolverhampton: shrubs and alpine plants.

Sir Mark Collet, Kemsing: *Iris Edelmannii.*

Messrs. Elliott, Stevenage: *Saxifraga Stribnyri.*

The Misses Hopkins, Coulsdon: rock garden.

Lt.-Col. Messel, Handcross: *Primula eucyclia,* K.W. 6822. This is a very small member of the Geranioides section, extremely rare in cultivation. The

4-inch scapes rise from a cluster of hairy, 7-lobed leaves, and each bears four or five comparatively large, fringed, rosy flowers with golden centres.

Mr. Mills, Croydon : *Saxifraga* ' Ruth.'
Messrs. Pulham, Bishop's Stortford : shrubs and alpine plants.
Messrs. Stewart, Ferndown : *Prunus incisa* variety.
Messrs. Veitch, Exeter : *Erica australis* ' Mr. Robert.'

FLORAL COMMITTEE, MARCH 27, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Baron B. Schröder (gr. Mr. Henderson), Englefield Green, for Hippeastrums and Clivias.

Silver Banksian Medal.

To Mr. G. H. Dalrymple, Bartley, for Freesias.
To Mr. E. J. Hicks, Hurst, for Roses.
To Messrs. S. Low, Enfield, for Carnations.
To Messrs. Sutton, Reading, for Wallflowers.

Banksian Medal.

To Lady Juliet Duff, Kingston Hill, for Stocks.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. G. W. Miller, Wisbech, for Primroses and Polyanthus.
To Mr. J. H. Pemberton, Havering, for Roses.
To Mr. G. Prince, Oxford, for Roses.

Award of Merit.

To Carnation ' Evelyn Townley ' as a variety for cutting (votes 13 for, 2 against), from R. Chetwynd-Stapylton, Esq. (gr. Mr. W. Meager), Great Berkhamsted. A bright rosy-cerise perpetual-flowering variety of good size and form. The blooms are very full, sweetly scented, and are borne on strong wiry stems.

Selected for trial at Wisley.

Polyanthus ' Barrowby Gem,' sent by Messrs. Prichard, Christchurch.

Other Exhibits.

Lady Aberconway and Hon. H. D. McLaren, Bodnant : Hippeastrums.
Messrs. Allwood, Haywards Heath : Carnation ' Wivelsfield Copper.'
Messrs. J. & A. H. Crook, Beaconsfield : Polyanthus.
Messrs. Dutton, Iver : Carnations.
Messrs. S. Low, Enfield : Cyclamen ' Eileen Low.'
Mr. A. J. Morgan, Steeple Aston : Hippeastrum seedlings.
Mr. B. Pinney, Shipbourne : Violets.
Primley Botanic Nursery, Paignton : Freesia seedlings.
Messrs. Reamsbottom, West Drayton : Anemones.
S. H. Ricardo, Esq., Aldwick : Carnation ' Mrs. Ricardo.'
Mrs. Torkington, Maidenhead : *Primula* ' White Jewel.'

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, nineteen other members and Mr. J. COMBER (visitor) present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mark Fenwick, Esq., Stow-on-the-Wold, for alpine plants.

Silver Banksian Medal.

To Messrs. Elliott & Co., Stevenage, for rock garden.
To Mr. Gavin Jones, Letchworth, for alpine plants.
To Messrs. Prichard, Christchurch, for alpine plants.

Banksian Medal.

To Messrs. Baker, Codsall, for shrubs and alpine plants.
To Messrs. Casburn & Welch, Cambridge, for alpine plants.
To Central Garden Supplies, Kenton, for shrubs and alpine plants.
To Messrs. Cutbush, Barnet, for shrubs and alpine plants.
To Messrs. Cuthbert, Southgate, for Azaleas.
To Messrs. Hodson, Nottingham, for shrubs and alpine plants.
To Mr. G. Reuthe, Keston, for shrubs and alpine plants.
To Messrs. Rogers, Southampton, for shrubs and alpine plants.
To Messrs. Russell, Richmond, for flowering shrubs.
To A. J. Sewell, Esq., Weybridge, for alpine plants.
To Messrs. Tucker, Oxford, for alpine plants.
To Messrs. Waterer, Twyford, for shrubs and alpine plants.

Award of Merit.

To *Azalea indica* 'Charme de Noël' as a greenhouse flowering shrub (votes unanimous), from Mr. W. F. Gullick, Salisbury. Very shapely, well-flowered bushes of this and the two following varieties were exhibited. The flowers of 'Charme de Noël' are double, and deep blush-pink in colour.

To *Azalea indica* 'Étoile de Belgique' as a greenhouse flowering shrub (votes unanimous), from Mr. W. F. Gullick. A floriferous variety bearing double flowers of rich, glowing ruby-red.

To *Azalea indica* 'Triumph' as a greenhouse flowering shrub (votes unanimous), from Mr. W. F. Gullick. A very bright and ornamental variety with double, deep rose flowers.

To *Fritillaria latifolia*, red form, as a hardy flowering bulb (votes unanimous), from Mrs. W. R. Dykes, Sutton Green. The flowering stems of this variety reach a height of about 10 inches and are clothed with broadly lanceolate leaves in the upper part. The solitary, terminal flowers are pendulous and of a sombre, reddish-purple hue.

To *Iris* × *Japo-Watt* as a tender flowering plant (votes 10 for, 1 against), from E. A. Bowles, Esq., Waltham Cross. An interesting hybrid (*I. japonica* × *I. Wattii*) raised by the exhibitor. The pale blue, orange-streaked flowers are larger and lighter in colour than those of *I. japonica*. The hybrid is, unfortunately, not hardy, but flowers for months in a cool greenhouse.

To Pernettya 'Bell's Seedling' as a hardy evergreen fruiting shrub (votes unanimous), from the Donard Nursery Co., Co. Down. A variety of *Pernettya mucronata* bearing very large fruits of crimson colour on stems of a similar shade. The glossy, dark green foliage is abundant.

To *Saxifraga* 'Mrs. G. Prichard' as a hardy flowering plant for the rock garden (votes unanimous), from Messrs. Prichard, Christchurch. A valuable addition to the series of pink-flowered, hybrid encrusted Saxifrages. The blush-pink blossoms of the specimen shown were so numerous as to cover completely the tufts of small, silvery leaves.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant: *Primula* species.
G. P. Baker, Esq., Sevenoaks: *Orchis fragrans*, species of *Anemone* and *Saxifraga*.
Messrs. Barr, Taplow: Fritillaria species.
Mr. W. Bates, Wokingham: *Prunus incisa*.
Messrs. Cheal, Crawley: shrubs and alpine plants.
Mrs. W. R. Dykes, Sutton Green: Tulipa hybrid.
Mr. W. F. Gullick, Salisbury: Azaleas.
The Marquis of Headfort, Kells, Co. Meath: *Rhododendron Genestierianum*.
The Misses Hopkins, Coulsdon: rock plants.
Sir Wm. Lawrence, Bt., Burford: *Aristea cyanea*, *Kalanchoe* sp., *Iris Lortetii*.
Messrs. Low, Enfield: shrubs.
Messrs. Maxwell & Beale, Broadstone: alpine plants.
Lt.-Col. Messel, Handcross: *Indigofera australis*.
W. Milne, Esq., Taplow: *Primula* × *Gulielmi*.
Messrs. Prichard, Christchurch: *Trillium rivale*.

Messrs. Pulham, Bishop's Stortford : rock plants.
Mr. G. Reuthe, Keston : shrubs and alpine plants.
Mr. Robinson, New Eltham : alpine plants.
Messrs. Stewart, Ferndown : alpine plants.
A. M. Williams, Esq., Launceston : *Rhododendron Middianum.*
Mr. F. G. Wood, Ashtead : alpine plants and shrubs.

Floral Committee, April 11, 1928.

Section A.

Mr. J. F. McLeod in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. G. H. Dalrymple, Bartley, for Freesias and *Primula pulverulenta* ' Bartley Strain.'

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. E. J. Hicks, Hurst, for Roses.

Banksian Medal.

To Messrs. B. Cant, Colchester, for Roses.
To Messrs. Cutbush, Barnet, for Roses.
To Mr. J. Douglas, Great Bookham, for Auriculas.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. S. Low, Enfield, for Carnations.
To Maytham Gardens, Rolvenden, for Aubrietias and Primroses.
To Mr. G. W. Miller, Wisbech, for Polyanthus, etc.
To Mr. J. H. Pemberton, Havering, for Roses.

Award of Merit.

To *Anthurium Rothschildianum* ' Comet ' as a warm greenhouse pot plant (votes 8 for), from Messrs. S. Low, Enfield. This variety has a large broad cream spathe heavily mottled with scarlet, and a prominent orange curled spadix.

To Auricula ' Bookham Glory ' as a pot plant (votes unanimous), from Mr. J. Douglas, Great Bookham. A crimson-purple variety slightly lighter in colour at the margins and having a broad white eye.

To Carnation ' Ivory ' as a variety for cutting and exhibition (votes 11 for), from Messrs. Allwood, Haywards Heath. A large white full-flowered perpetual-flowering variety with deeply serrated petals. It is sweetly scented, and very free flowering.

To *Primula rosea* ' Brockhurst ' as a rock garden plant (votes 11 for), from F. J. Hanbury, Esq., East Grinstead. The flowers of this variety which came up in a batch of seedlings in Mr. Hanbury's garden are larger and of a more brilliant bright rose-pink than those of the type.

Selected for trial at Wisley.

Polyanthus ' Barrowby Gem,' from Mrs. MacColl, Harrogate, and Mr. R. V. Roger, Pickering.

Aubrietia ' Russell Vincent,' from Messrs. Prichard, Christchurch.

Other Exhibits.

Messrs. Barr, Taplow : Polyanthus.
Messrs. J. & A. H. Crook, Beaconsfield : Polyanthus.
Messrs. Cutbush, Barnet : Polyantha Rose ' Sunshine.'
Messrs. Dutton, Iver : Carnations.
Mrs. Fremantle, Penn : Polyanthus ' Greenways Strain.'
Mrs. Hosking, Merton Park : *Primula* ' Tess.'

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Hillier, Winchester, for flowering shrubs.
To Mr. Gavin Jones, Letchworth, for alpine plants.
To Messrs. Prichard, Christchurch, for alpine plants and shrubs.
To Messrs. Waterer, Twyford, for alpine plants and shrubs.

Banksian Medal.

To Messrs. Cutbush, Barnet, for alpine plants and shrubs.
To Messrs. Low, Enfield, for Australian shrubs.
To Messrs. Maxwell & Beale, Broadstone, for alpine plants and shrubs.
To Messrs. Pulham, Bishop's Stortford, for alpine plants and shrubs.
To Messrs. Rogers, Southampton, for alpine plants and shrubs.
To Messrs. Russell, Richmond, for flowering shrubs.
To Messrs. Tucker, Oxford, for alpine plants.
To Mr. F. G. Wood, Ashtead, for alpine plants and shrubs.
To Messrs. Wm. Wood, Taplow, for alpine plants and shrubs.

Lindley Medal.

To Roger Bevan, Esq., Henley, for alpine plants.

Award of Merit.

To *Anemone pavonina* as a hardy flowering plant (votes unanimous), from R. D. Trotter, Esq., Ockley. In form and size much like *Anemone coronaria.* The flowers are bright scarlet, with a central cluster of black stamens.

To *Hippeastrum puniceum* var. *ignescens* as a flowering plant for cool greenhouse (votes 11 for, 3 against), from E. M. Preston, Esq., Hayes. This variety bears flowers of bright orange-salmon with white markings, on stalks about 2 feet high.

To *Prunus* ' Unimeko ' as a hardy flowering shrub (votes unanimous), from Collingwood Ingram, Esq., Benenden. This is a hybrid of *P. speciosa* × *P. incisa.* The flowers are larger than those of the latter species, white, and produced with the pale green foliage.

To *Pyrus* ' Russell's Weeper ' as a hardy flowering tree (votes unanimous), from Messrs. Russell, Richmond. A pretty, white-flowered Crab of unusually pendent habit, likely to be of great value as a weeping standard tree.

Other Exhibits.

Lt.-Col. Stephenson Clarke, Cuckfield : *Rhododendron hemitrichotum.*
T. Hay, Esq., Hyde Park : *Cynoglossum grande, Fremontia mexicana.*
Messrs. Hodson, Nottingham : alpine plants and shrubs.
Misses Hopkins, Coulsdon : alpine plants.
C. Ingram, Esq., Benenden : *Prunus* ' Taizanfukun.'
E. Marsden-Jones, Esq., Devizes : *Primula* ' Garnet.'
Sir Frederick Milner, Bt., Taplow : Meconopsis K.W. 6862.
L. de Rothschild, Esq., Exbury : *Rhododendron* sp.
Messrs. Russell, Richmond : *Pyrus Malus alba prostrata, Pyrus Malus* ' Crimson Weeper.'
Mr. Stephen Sims, Draycott : alpine plants and shrubs.
B. Symons-Jeune, Esq., Old Windsor : *Primula viscosa* forma.
Mr. G. G. Whitelegg, Chislehurst : alpine plants and shrubs.

FLORAL COMMITTEE, APRIL 24, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and ten other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Schizanthus.
To Messrs. Sutton, Reading, for Nemesias.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Cutbush, Barnet, for Roses.
To Mr. G. H. Dalrymple, Bartley, for Freesias and Primulas.
To Mr. A. Dawkins, Chelsea, for Calceolarias.
To Mr. J. Douglas, Great Bookham, for Auriculas.
To Mr. E. J. Hicks, Twyford, for Roses.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and *Dianthus Allwoodii.*
To Messrs. F. Cant, Colchester, for Roses.
To Mr. J. R. Crowhurst, Burgess Hill, for Polyanthus 'Barrowby Gem.'
To Messrs. Cuthbert, Southgate, for Hydrangeas.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. G. W. Miller, Wisbech, for Polyanthus.
To Mr. J. H. Pemberton, Havering, for Roses.

Award of Merit.

To *Anemone* 'Everton Strain' as a hardy variety for cutting (votes unanimous), from Mrs. Kemmis (gr. Mr. Chapman), Lymington, Hants. A beautiful strain of scarlet and violet blue Anemones. There are single and double flowers measuring over 5 inches in width when fully open. The petals of the former are broad and those of the latter narrow. The scarlet flowers have a light zone round the centre.

To Carnation 'The Lady Seaforth' as a variety for cutting and exhibition (votes unanimous), from the Lady Seaforth, C.B.E. (gr. Mr. W. Evans), Haywards Heath. A splendid white perpetual flowering variety of large size and good form. The blooms are at least 4 inches across, very full, with broad crinkled petals and a very pronounced clove scent. They have short non-bursting calyces and are borne on very long strong stems.

To Hippeastrum 'Baroness Schröder' as a warm greenhouse pot plant (votes unanimous), from Baron Schröder (gr. Mr. E. J. Henderson), Englefield Green. A very large rounded variety resulting from a cross between two unnamed seedlings. Its colour is glowing rosy-cerise.

Selected for trial at Wisley.

Polyanthus 'Barrowby Gem,' sent by Mr. J. R. Crowhurst, Burgess Hill.
Polyanthus 'David Neave,' sent by Messrs. H. Morse, Norwich.

Other Exhibits.

Messrs. J. & A. Crook, Beaconsfield : Polyanthus.
J. R. Fothergill, Esq., Thame : Viola 'Fothergill's Violatrum.'
Mrs. A. Fremantle, Penn : Polyanthus.
Miss F. Hardy, Knockholt : Primroses.
Mr. B. Pinney, Shipbourne : Violets, Polyanthus, etc.
Messrs. Reamsbottom, West Drayton : Anemones.
Mr. R. V. Roger, Pickering : Polyanthus.
Mr. L. R. Russell, Richmond : stove plants.
Messrs. Stark, Fakenham : Polyanthus.

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, nineteen other members and Messrs. J. G. Millais, J. J. Crosfield, and J. Comber (visitors) present.

Awards Recommended :—

Gold Medal.

To Messrs. Elliott, Stevenage, for rock garden.

Silver Banksian Medal.

To Mr. Gavin Jones, Letchworth, for alpine plants.
To Mr. R. C. Notcutt, Woodbridge, for flowering shrubs.
To Messrs. Prichard, Christchurch, for alpine plants and shrubs.
To Mr. G. Reuthe, Keston, for alpine plants and shrubs.

Banksian Medal.

To Messrs. Baker, Codsall, for alpine plants and shrubs.
To Messrs. Casburn & Welch, Cambridge, for alpine plants.
To Central Garden Supplies, Kenton, for alpine plants and shrubs.
To Messrs. Cheal, Crawley, for flowering shrubs.
To Messrs. Jeans & Trowbridge, West Moors, for alpine plants and shrubs.
To Messrs. Ladhams, Southampton, for alpine plants and shrubs.
To Messrs. Low, Enfield, for Australian shrubs.
To Messrs. Maxwell & Beale, Broadstone, for alpine plants.
To Messrs. Pulham, Bishop's Stortford, for alpine plants.
To Mr. J. Robinson, New Eltham, for alpine plants.
To Messrs. Rogers, Southampton, for alpine plants and shrubs.
To Messrs. Russell, Richmond, for flowering shrubs.
To Mr. Stephen Sims, Draycott, for alpine plants and shrubs.
To Messrs. Tucker, Oxford, for alpine plants.
To Messrs. Waterer, Twyford, for alpine plants and shrubs.
To Mr. F. G. Wood, Ashtead, for alpine plants and shrubs.
To Messrs. Wood, Taplow, for alpine plants and shrubs.

Award of Merit.

To *Calceolaria crenatiflora* as a flowering plant for cool greenhouse (votes 9 for), from Lt.-Col. L. C. R. Messel, Handcross. An ornamental species forming a flattish rosette of downy, grey-green leaves, from which the panicles rise to a height of 1 foot. The flattish flowers are 1 inch long, yellow, slightly striped with brown.

To *Primula cernua* as a flowering plant for cool greenhouse (votes 6 for, 3 against), from C. T. Musgrave, Esq., Godalming. A small Muscarioid species, with leaves 2 inches long. The scape is about 7 inches high, and bears a spherical spike of small, deep violet flowers, mealy within.

To *Primula Menziesiana* as a flowering plant for cool greenhouse (votes unanimous), from Mr. R. C. Notcutt, Woodbridge. One of the best of the Muscarioides section. The mealy spike rises from a rosette of softly hairy, lanceolate leaves. The comparatively large flowers are clear violet-blue in colour and very fragrant. The sepals are olive-green with mealy margins.

To *Rhododendron* 'Anne' as a hardy flowering shrub (votes 8 for, 4 against), from Lt.-Col. L. C. R. Messel, Handcross. This is a very hardy hybrid of *R. Thomsonii*. The trusses of flowers are large, the individual flowers widely expanded, pink.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant: *Rhododendron* sp., *Primula Genestieriana.*
Messrs. Cutbush, Barnet: Azaleas.
Misses Hopkins, Coulsdon: rock plants.
Sir Wm. Lawrence, Bt., Burford: *Primula deflexa.*
Mrs. Lloyd Thomas, Shrivenham: double red Peach.
Lt.-Col. Messel, Handcross: *Nastanthus patagonicus.*
Mrs. H. Milford, Chedworth: *Primula chrysopa.*
Sir John Ramsden, Bt., Gerrard's Cross: Rhododendrons.
D. A. Rawlence, Esq., Kingston Hill: *Anchusa myosotidiflora.*
The Duchess of Roxburghe, Kelso: *Sansevieria Laurentii.*

FLORAL COMMITTEE, MAY 1, 1928.

Section B.

AT THE RHODODENDRON SHOW.

Mr. G. W. E. LODER, F.L.S., in the Chair, fourteen other members and Mr. J. COMBER (visitor) present.

Awards Recommended :—

Award of Merit.

To *Rhododendron keleticum* as a hardy flowering shrub (votes 9 for, 1 against), from Messrs. Gill, Falmouth. A pretty, dwarf, Chinese species collected by Forrest. The shining, dark green leaves are shortly stalked, ½ inch long, and brownish beneath. The flowers are comparatively large, lilac, red-spotted, darker externally.

To *Rhododendron* ' Linley Sambourne ' as a hardy flowering shrub (votes unanimous), from Lt.-Col. L. C. R. Messel, Handcross. A variety with large trusses of rich pink flowers, the bases of which are blotched with carmine.

To *Rhododendron* ' Mars ' as a hardy flowering shrub (votes 9 for, 1 against), from Messrs. Waterer, Bagshot. The plant exhibited carried medium-sized clusters of rich crimson flowers. The flowers are widely campanulate and distinct in appearance.

To *Rhododendron* ' Princess Juliana ' as a hardy flowering shrub (votes 9 for, 1 against), from Messrs. Cuthbert, Southgate. A hybrid Azalea, forming a dense, free-flowering bush. The flowers are bright yellow, shaded orange.

FLORAL COMMITTEE, MAY 8, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Calceolarias.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. F. Cant, Colchester, for Roses.
To Mr. H J. Jones, Lewisham, for Hydrangeas.
To J. P. Morgan, Esq., Watford, for Streptocarpus.
To Mr. J. H. Pemberton, Havering, for Roses.

Banksian Medal.

To Mr. J. Douglas, Great Bookham, for Auriculas.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. S. Low, Enfield, for Carnations.
To Mr. G. W. Miller, Wisbech, for Polyanthus and Trollius.
To Messrs. Sander, St. Albans, for Anthuriums.

First-class Certificate.

To Carnation ' Mrs. A. J. Cobb ' as a variety for cutting (votes 12 for, 4 against), from Messrs. A. F. Dutton, Iver. A glowing crimson perpetual-flowering variety with a very decided and pleasing clove scent. The flowers are large and have non-bursting calyces. They are borne on rigid stems of great length. This variety was awarded the *Daily Mail* Gold Challenge Cup for the best new scented Carnation.

Award of Merit.

To Hydrangea ' Mrs. A. Simmonds ' as a greenhouse plant (votes 11 for), from Mr. H. J. Jones, Lewisham. A very useful variety with medium-sized compact heads of bright salmon-rose flowers irregularly serrated at the edges.

Selected by the Joint Iris Committee for trial at Wisley.

Iris barbata ' Sunbeam,' from the Orpington Nurseries, Orpington.

Other Exhibits.

Messrs. Baker, Codsall : *Primula* ' Pam.'
Mrs. Bertie Bell, Guernsey : Gerberas.
Mr. G. Cave, Dovercourt : Auricula ' Lavendel.'
Messrs. Cheal, Crawley : Dahlias.
Messrs. J. & A. H. Crook, Beaconsfield : Polyanthus.
Mr. S. A. Goodliffe, Bishop's Stortford : Delphiniums.
Murray Hornibrook, Esq., Ripley : *Papaver orientale* ' Fireball.'
Messrs. Jarman, Chard : Pelargoniums and Violas.
Messrs. Ladhams, Southampton : herbaceous plants.
Little Munden Nurseries, Ware : herbaceous plants.
Mr. B. Pinney, Shipbourne : Violets.

Messrs. Reamsbottom, West Drayton : Anemones.
Baron B. Schröder, Englefield Green : Hippeastrum ' Carmen.'
Suffolk Seed Stores, Woodbridge : Pyrethrum ' Kingston Early.'
Mrs. R. Taylor, Uxbridge : Auricula ' Mrs. R. Taylor.'
Mrs. N. Wills, Stroud : seedling Carnations.

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, seventeen other members and Mr. J. Comber (visitor) present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Low, Enfield, for Australian shrubs.
To Mr. R. C. Notcutt, Woodbridge, for shrubs.
To Messrs. Prichard, Christchurch, for alpine plants and shrubs.

Banksian Medal.

To Messrs. Baker, Codsall, for alpine plants and shrubs.
To Messrs. Cheal, Crawley, for alpine plants and shrubs.
To Messrs. Elliott, Stevenage, for alpine plants.
To Mr. Gavin Jones, Letchworth, for alpine plants.
To Messrs. Maxwell & Beale, Broadstone, for alpine plants.
To Messrs. Rogers, Southampton, for alpine plants and shrubs.
To Messrs. Russell, Richmond, for shrubs.
To A. J. Sewell, Esq., Weybridge, for alpine plants.
To Messrs. Waterer, Twyford, for alpine plants and shrubs.
To Mr. F. G. Wood, Ashtead, for alpine plants and shrubs.
To Messrs. Wm. Wood, Taplow, for alpine plants and shrubs.

Award of Merit.

To *Aethionema Warley ruber* as a hardy flowering plant for the rock garden (votes 9 for, 1 against), from Miss E. Willmott, Warley Place. This variety is of rather dwarf habit, and produces freely flowers of deep purplish-pink.

To *Ranunculus cortusaefolius* as a flowering plant for the cool greenhouse (votes unanimous), from E. M. Preston, Esq., Hayes. A magnificent Buttercup of vigorous growth, from the island of Teneriffe. The basal leaves are deeply 5-lobed, glossy, 6 inches in diameter. The flowering stems are 2 feet in height, much branched, and bear numerous glossy-petalled, golden flowers with orange stamens.

To *Ourisia coccinea* as a hardy flowering plant (votes 12 for, 1 against), from Lt.-Col. L. C. Messel, Handcross. A good form of a well-known plant. The ovate, crinkled leaves form a flattish rosette from which rises a tall branched stem bearing tubular, scarlet flowers 1½ inch long.

To *Pyrus Lemoinei* as a hardy flowering tree (votes unanimous), from Mr. R. C. Notcutt, Woodbridge. An ornamental, small tree with bronze-coloured foliage and deep rose blossoms.

To *Pyrus Malus theifera* as a hardy flowering tree (votes unanimous), from the Hon. Vicary Gibbs, Elstree. A good variety of Crab with pale green leaves and large white flowers opening from pink buds.

To *Rhododendron* ' Rosemary Chipp ' as a hardy flowering shrub (votes 11 for, 1 against), from the Director, Royal Botanic Gardens, Kew. A hybrid of *R. Loderi* × *R. orbiculare.* Leaves elliptical, 5 inches long, dark green above, paler beneath. The trusses are large and dense, the individual flowers widely campanulate, 7-lobed, pale rose-pink, more deeply coloured in the bud stage.

Cultural Commendation.

To Sir Wm. Lawrence, Bt., Burford, for *Silene Hookeri.*

Other Exhibits.

Messrs. Elliott, Stevenage : *Oxalis gigantea.*
The Hon. Vicary Gibbs, Elstree : shrubs.
The Misses Hopkins, Coulsdon : rock plants.
Murray Hornibrook, Esq., Ripley : *Rosa* sp. aff. *R. Hugonis.*
John Innes Hort. Inst., Merton : *Iris japonica, Drimys Winteri.*

E. P. Magor, Esq., St. Tudy : Rhododendron hybrid.
Mr. H. N. Marrett, Chelmsford : alpine plants.
Lt.-Col. Messel, Handcross : *Calceolaria Germaini* Comber 720.
E. M. Preston, Esq., Hayes : *Zephyranthes mesochloa.*
Mr. J. Robinson, New Eltham : alpine plants.
A. J. Sewell, Esq., Weybridge : *Myosotis australis.*
Mr. Stephen Sims, Draycott : alpine plants.
Rt. Hon. Lord Swaythling, Southampton : *Meconopsis* spp.
Messrs. Waterer, Twyford : *Trollius pumilus* Wargrave var.
Messrs. Wood, Taplow : *Primula farinosa* ' Craven Gem.'

FLORAL COMMITTEE, MAY 22, 1928.

Section A.

AT CHELSEA.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-four other members present.

Awards Recommended :—

Award of Merit.

To Begonia ' Florence Bigland ' as a variety for exhibition and cultivation in pots (votes unanimous), from Messrs. Blackmore & Langdon, Bath. A large double bright apricot variety of excellent form. The petals are broad and the plants very free flowering.

To Carnation ' Citron ' as a variety for cutting (votes unanimous), from Messrs. Engelmann, Saffron Walden. A ' Fancy ' perpetual-flowering variety of good form. The ground colour is pale yellow flaked with pale cerise and white.

To Carnation ' Sunny ' as a variety for cutting (votes unanimous), from Messrs. Engelmann, Saffron Walden. A perpetual-flowering variety with a very full flower of excellent form. The ground colour is apricot lightly flaked with bright cerise.

To Geum ' Fire Opal ' as a border plant (votes 11 for, 4 against), from Messrs. Carter Page, London. This useful border plant, which has the advantage of flowering over a long period, is reported to have originated in a Yorkshire nursery. Its flowers are large, semi-double, and of a rich dark orange-red colour.

To Hydrangea ' D. Ingamells ' as a market and greenhouse pot plant (votes unanimous), from Mr. H. J. Jones, Lewisham. This variety bears well-formed trusses of widely toothed petals of a rich glowing pink colour lightly tinted with green in the early stages.

To Hydrangea ' H. J. Jones ' as a market and greenhouse pot plant (votes unanimous), from Mr. H. J. Jones, Lewisham. This variety produces large heads of rounded flattish flowers with smooth edges. The colour is a vivid rich pink lightly flushed with rose. This variety is considered to be one of the best pink Hydrangeas yet raised.

To Hydrangea ' Mrs. R. F. Felton ' as a market and greenhouse pot plant (votes 14 for), from Mr. H. J. Jones, Lewisham.. The deep cerise-pink flowers of this variety are large with regularly serrated edges.

To *Nymphaea pygmaea rubra* as a hardy water plant (votes 15 for), from Mr. A. Perry, Enfield. This delightful little water lily is of garden origin, and is suitable for shallow fountains or small pools in the rock garden. Its flowers are scarcely more than 2 inches across and are deep rosy-pink in colour.

To Rose ' Gloria Mundi ' as a variety for market and bedding (votes unanimous), from Messrs. Sliedrecht, Boskoop, Holland. A dwarf polyantha variety with bright scarlet flowers. It was raised by Mr. G. de Ruiter of Hazerswoude, Holland.

To Rose ' Lady Forteviot ' as a variety for bedding (votes 14 for), from Messrs. B. R. Cant, Colchester. A variety of the Pernetiana section with large rich apricot flowers of good form.

Selected for trial at Wisley.

Iris ' El Capitan,' from G. L. Pilkington, Esq., Liverpool.
Viola ' Baby Princess,' from A. J. Cobb, Esq., Reading.
Wallflower ' Ellen Rannow,' from Mr. A. Hansen, Copenhagen, Denmark.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Dianthus 'Sweet Wivelsfield' and Carnation 'Wivelsfield Salmon.'
Messrs. Cutbush, Barnet: Roses.
Messrs. Dobbie, Edinburgh: *Mimulus coccineus.*
Mr. J. Douglas, Great Bookham: Carnation 'Teviotdale.'
Mr. G. R. Downer, Chichester: Lupin 'Duchess of Richmond.'
Mr. C. H. Herbert, Birmingham: Pink 'Delight.'
Mr. H. Marcham, Carshalton: Violas.
Messrs. Prichard, Christchurch: Pink 'Mrs. Lindsey Jones.'
Mr. H. Prins, Wisbech: Hyacinth 'Sir Douglas Haig.'
Messrs. Robinson, Eltham: Viola 'Crimson Beauty.'
Messrs. W. H. Simpson, Birmingham: Antirrhinum 'Princess Elizabeth.'
Mr. A. Young, Oxted: *Bellis perennis* 'Princess Elizabeth.'

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, twenty-four other members and Messrs. J. COMBER, J. J. CROSFIELD, and J. G. MILLAIS (visitors) present.

Awards Recommended:—

Award of Merit.

To *Adiantum flabellatum* as a half-hardy fern (votes unanimous), from Mr. Amos Perry, Enfield. An elegant species, 1½ feet high. The black stalks are finely branched and spreading. The pinnules are triangular, slightly notched, ½ to ¾ inch long, pale green.

To Azalea 'Magog' as a hardy flowering shrub (votes unanimous), from A. Williams, Esq., Launceston. A variety of compact growth and free-flowering habit. The beauty of its scarlet flowers is enhanced by the reddish tint of the young foliage.

To *Calceolaria Darwinii* as a hardy flowering plant (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A dwarf species, with flat rosettes of foliage suggestive of small Plantain leaves. The flowers are almost sessile, 1 inch long, dark chestnut brown on a yellow ground, with a distinct white rim.

To *Chrysanthemum Mawii* as a hardy flowering plant (votes 12 for, 6 against), from Lady Lawrence, Burford. A pretty species from the Atlas Mountains. Its soft pink, brown-centred flowers are produced singly at the ends of slender stems clothed with finely divided foliage.

To Cytisus 'Lady Moore' as a hardy flowering shrub (votes 12 for, 4 against), from Messrs. Watson & Sons, Killiney. A variety of strong growth. The large flowers are yellow, heavily suffused with strawberry red, paler externally.

To *Dicentra chrysantha* as a hardy flowering plant (votes unanimous), from L. de Rothschild, Esq., Exbury. An ornamental herbaceous plant 3 to 4 feet high with finely divided, glaucous foliage like that of a Thalictrum, and erect, terminal panicles of small yellow flowers. A distinct species, rare in cultivation.

To *Dracocephalum speciosum* as a hardy flowering plant (votes unanimous), from T. Hay, Esq., Hyde Park. This is an uncommon Himalayan species, nearly 1 foot in height. The spikes are closely set with whorls of large, deep lavender flowers. The leaves are greyish and softly hairy.

To *Gazania pavonia* as a half-hardy flowering plant (votes unanimous), from T. Hay, Esq., Hyde Park. This species has brilliant scarlet flowers with a brown-purple zone near the disc. They rise singly from the tuft of narrow-pinnate leaves. A most handsome plant for the greenhouse or for summer bedding.

To *Lonicera pyrenaica* as a hardy flowering shrub (votes 15 for, 1 against), from Mr. W. J. Marchant, Wimborne. A compact shrub, bearing small, ovate-lanceolate leaves and axillary flowers in pairs. The small, campanulate flowers are creamy-white.

To *Primula heucherifolia* as a hardy flowering plant (votes unanimous), from Dr. Macwatt, Duns. A species of the Cortusoides section, with characteristic hairy, lobed leaves of deep green. The scapes rise above the foliage to a height of 6 inches, bearing large clusters of pendent, magenta-rose flowers with eyes of darker shade.

To Syringa 'Massena' as a hardy flowering shrub (votes unanimous), from Major Stern, Goring-by-Sea. A magnificent Lilac, bearing dense panicles 9 inches long. The fragrant flowers are nearly ¾ inch across, bright rosy-mauve in colour.

To *Syringa Wilsonii* as a hardy flowering shrub (votes unanimous), from Dame Alice Godman, D.B.E., Horsham. The panicles of this Chinese species are long and narrow: the flowers small, tubular, pale rose, with somewhat conspicuous yellow anthers. The leaves are smooth, bright green, greyish beneath.

Cultural Commendation.

To Mrs. Walter Jones, Comrie, for *Linnaea borealis.* Although a familiar plant, Linnaea is seldom so well exhibited as on this occasion, when a large pan, completely filled with plants in profuse bloom, was shown.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant: *Rhododendron* 'Vanessa.'
Donard Nursery Co., Co. Down: Cytisus 'Donard Seedling.'
Messrs. Fletcher, Chertsey: *Rhododendron* 'Alfred Astley.'
Dame Alice Godman, Horsham: *Viburnum japonicum, Enkianthus* sp., *Saxifraga* sp.
Mr. W. E. Th. Ingwersen, East Grinstead: *Primula Kaufmanniana.*
Sir Wm. Lawrence, Bt., Burford: Pentas sp., *Laurentia tenella, Senecio speciosus, Isoplexis canariensis, Jacobinia magnifica carnea,* Syringa 'Paul Thirion,' Syringa 'Mont Blanc.'
Mr. W. J. Marchant, Wimborne: *Celmisia spectabilis argentea.*
E. M. Marsden-Jones, Esq., Devizes: Geum 'Dolly North.'
Mrs. Philip Martineau, Ascot: *Rhododendron* 'Rose Croix,' *Cytisus albus* 'Shower.'
Mrs. Helen Milford, Chedworth: *Primula chrysopa.*
Mrs. Hugo Miller, Camberley: *Aquilegia viridiflora.*
W. M. Milner, Esq., Maidenhead: *Primula* spp.
Messrs. Oliver & Hunter, Moniave: *Primula prionotes.*
Mr. Amos Perry, Enfield: *Aponogeton abyssinicus.*
Primley Nursery, Paignton: *Primula obconica* var.
Major Stern, Goring: *Paeonia Woodwardii.*
Countess of Strathmore, Welwyn: *Primula nutans.*
Messrs. Walters, Cheltenham: *Paeonia Woodwardii* var. *colesbornensis.*
Messrs. Watson, Killiney: Cytisus 'C. E. Pearson.'
A. M. Williams, Esq., Launceston: Azalea 'Gog.'

Floral Committee, June 5, 1928.

Section A.

Mr. H. B. May, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. R. Bolton, Halstead, for Sweet Peas.
To Messrs. Dobbie, Edinburgh, for Antirrhinums.

Silver-gilt Banksian Medal.

To Messrs. Barr, Taplow, for Irises.
To Messrs. Bunyard, Maidstone, for Irises.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Bath, Wisbech, for herbaceous plants.
To J. H. Batty, Esq. (gr. Mr. G. Stacey), Chorley Wood, for Hydrangeas.
To Messrs. Dickson, Newtownards, for Sweet Peas.
To Mrs. W. R. Dykes, Woking, for Irises.
To Maytham Gardens, Rolvenden, for Campanulas.
To Mr. G. W. Miller, Wisbech, for herbaceous plants.
To Messrs. W. H. Simpson, Birmingham, for Lupins and Antirrhinums.
To Messrs. Sutton, Reading, for Zinnias and Antirrhinums.
To Messrs. Waterer, Sons & Crisp, Twyford, for Irises.

Banksian Medal.

To Messrs. Baker, Wolverhampton, for Astilbes.
To Mr. T. Carlile, Twyford, for Delphiniums.
To Messrs. Easlea, Leigh-on-Sea, for Roses.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. Gavin Jones, Letchworth, for herbaceous plants.
To Messrs. Kelway, Langport, for herbaceous plants.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. H. G. Longford, Abingdon, for Irises and Poppies.
To Orpington Nurseries, Orpington, for Irises.
To Messrs. Prichard, Christchurch, for herbaceous plants.
To Messrs. Russell, Richmond, for stove plants, Lilies, etc.
To W. E. T. Skilton, Esq., Bromley, for Gloxinias.
To Messrs. Stewart, Wimborne, for Irises, etc.
To Mr. G. G. Whitelegg, Chislehurst, for Irises.

Award of Merit.

To *Iris sibirica* ' Caesar ' (votes unanimous), from Viscountess Byng of Vimy, Thorpe-le-Soken. A variety raised by Mr. Cleveland Morgan, U.S.A. The falls are very broad and rounded and of a rich deep violet-purple colour with amber markings at the top of the falls.

To *Iris sibirica* ' Ottawa ' (votes unanimous), from Viscountess Byng of Vimy, Thorpe-le-Soken. This plant was raised at the Botanical Experimental Station, Ottawa. It has very broad rounded falls of a deep violet-purple colour, and each has a conspicuous white blotch.

To Poppy ' Barton Mills Strain ' (votes unanimous), from Mr. R. Sandford, Mildenhall. A beautiful strain of Iceland Poppies suitable for cutting and market work. The large single flowers are borne on strong stems over 2 feet long. The range of colours is bright and pleasing and includes shades of pale lemon, bright yellow, gold, bright orange and white.

To Poppy ' Pride ' (votes 8 for), from Mrs. Talbot, Haileybury College, Hertford. A very handsome Oriental Poppy suitable for the herbaceous border. It grows 4 feet high and has very large deep scarlet petals with big black blotches at the base.

Selected for trial at Wisley.

Antirrhinum ' C. H. Herbert,' from Messrs. W. H. Simpson, Birmingham.
Iris ' Canadian Gold,' from Lady Byng of Vimy, Thorpe-le-Soken.
Iris ' Grey Lady,' from G. L. Pilkington, Esq., Liverpool.
Iris ' Kenya,' from G. L. Pilkington, Esq., Liverpool.
Iris ' Ramilahs,' from W. Sadler, Esq., Streatham.
Iris ' W. R. Dykes,' from Orpington Nurseries, Orpington.
Iris ' Wynn Hellings,' from F. Wynn Hellings, Esq., Kingston Hill.

Other Exhibits.

The Rt. Hon. Earl Beatty, Leicester : Geum ' Kathleen.'
Miss Boon, Chiswick : seedling Iris.
Messrs. Cuthbert, Southgate : Tritonia ' Prince of Orange.'
Messrs. Dutton, Iver : Carnations.
Mr. F. Gifford, Hornchurch : Pæonies.
S. Jacobs, Esq., Oxford : Delphinium ' Joan.'
Mrs. Leach, Hillingdon : Lupin ' Margaret.'
Messrs. Low, Enfield : Carnations.
G. S. Lysaght, Esq., Washford : Carnation ' Mrs. Gerald Lysaght.'
Mr. J. H. Pemberton, Havering : Roses.
Mr. H. Prins, Wisbech : herbaceous plants.

Section B.

Mr. W. J. Bean, V.M.H., in the Chair, seventeen other members and Mr. J. Comber (visitor) present.

Awards Recommended :—

Banksian Medal.

To Messrs. Elliott, Stevenage, for alpine plants.
To Mr. Gavin Jones, Letchworth, for alpine plants.
To Messrs. Maxwell & Beale, Broadstone, for alpine plants.

To Messrs. Pulham, Bishop's Stortford, for alpine plants.
To Mr. J. Robinson, New Eltham, for alpine plants.
To Messrs. Rogers, Southampton, for alpine plants.
To Messrs. Tucker, Oxford, for alpine plants.

Award of Merit.

To *Embothrium coccineum* as a tender flowering shrub (votes unanimous), from Mrs. Bolitho, Penzance. A well-known shrub bearing terminal racemes of bright scarlet tubular flowers 2 inches long. The elliptical leaves are shortly stalked, dark above and paler beneath.

To *Ranunculus asiaticus* as a hardy flowering plant (votes unanimous), from E. T. England, Esq., Barnet. A handsome border plant. The large, scarlet, dark-centred flowers are carried singly on long stalks, and in appearance recall those of some Anemones.

To *Syringa yunnanensis* as a hardy flowering shrub (votes 12 for), from Collingwood Ingram, Esq., Benenden. This species is similar in appearance to *S. Wilsonii*, which received recognition at a recent meeting. The oblong-lanceolate leaves are glaucescent beneath, the flowers narrow-tubular, pinkish-lilac.

To *Venidium fastuosum* as a tender flowering annual (votes unanimous), from T. Hay, Esq., Hyde Park. A very ornamental, half-hardy annual Composite from South Africa. The flower-heads have dark centres and deep orange-red rays. This species is suitable for summer bedding or for the greenhouse.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant: *Rhododendron aureum*, *Primula* × '*anisodoxa*.'
Central Garden Supplies, Kenton: shrubs and alpine plants.
The Hon. Vicary Gibbs, Elstree: shrubs.
Lt.-Col. Heseltine, Eastleigh: *Syringa Wilsonii.*
C. Ingram, Esq., Benenden: *Watsonia tabularis.*
T. Ashton Lofthouse, Esq., Middlesbrough: *Meconopsis superba.*
Messrs. Low, Enfield: *Tremandra verticillata.*
Merrivale Nurseries, Chelmsford: alpine plants.
Lt.-Col. Messel, Handcross: *Calceolaria biflora*, *Mimulus Bridgesii*, *Astragalus domvkoanus.*
Mr. R. C. Notcutt, Woodbridge: Azalea 'Mrs. Jas. Dykhuis,' Cytisus vars.
Messrs. L. R. Russell, Richmond: *Lilium sutchuenense.*
Mr. S. Sims, Draycott: alpine plants.
R. D. Trotter, Esq., Ockley: *Delphinium Consolida.*
Mr. F. G. Wood, Ashtead: alpine plants.

FLORAL COMMITTEE, JUNE 19, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Pæonies and Delphiniums.
To Messrs. Blackmore & Langdon, Bath, for Delphiniums.
To Messrs. Bunyard, Maidstone, for Pæonies and Irises.
To Messrs. Prichard, Christchurch, for herbaceous plants.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Barr, Taplow, for Irises.
To Messrs. Bloom, Oakington, for Heucheras.
To Mr. T. Carlile, Twyford, for Delphiniums and Sidalceas.
To Messrs. Carter, Raynes Park, for *Clerodendron fallax.*
To Messrs. Dobbie, Edinburgh, for Sweet Peas.

To Lady Juliet Duff, Kingston Hill, for Crassulas.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Mr. J. Stevenson, Wimborne, for Sweet Peas.
To Messrs. Stewart, Wimborne, for Irises.
To Messrs. Sutton, Reading, for Iceland Poppies.

Banksian Medal.

To Messrs. Baggesens, Tunbridge Wells, for Pæonies.
To Messrs. Bunyard, Maidstone, for old-fashioned Roses.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. H. G. Longford, Abingdon, for Irises, Pinks, etc.
To Mr. G. W. Miller, Wisbech, for herbaceous plants.
To Messrs. Redgrove, Borough Green, for herbaceous plants.
To Messrs. Russell, Richmond, for greenhouse plants.
To Messrs. Wood, Taplow, for herbaceous plants.

Award of Merit.

To *Papaver orientale* ' Fortune ' (votes 12 for, 2 against), from F. W. Copeland, Esq., Southampton. A very pleasing old rose Oriental Poppy suitable for the herbaceous border. It was raised by the exhibitor.

Selected for trial at Wisley.

Delphinium ' Knight of Somerset,' from Messrs. Kelway, Langport.
Delphinium ' Mrs. Newton Lees,' from Messrs. Blackmore & Langdon, Bath.
Delphinium ' Philip Butler,' from Messrs. Blackmore & Langdon, Bath.
Zonal Pelargonium ' William Bateson,' from Sir William Lawrence, Bt., Dorking.

Other Exhibits.

Messrs. Bloom, Oakington : Heucheras.
J. Brown, Esq., Redhill : Carnation ' Gladys.'
Mrs. Burnand, Uxbridge : Zonal Pelargonium ' Eva Burnand.'
Messrs. Dutton, Iver : Carnations.
Mrs. Hayes, Market Drayton : Poppy ' Mrs. John Hayes.'
Messrs. Hollamby, Groombridge : Campanulas.
Mr. Gavin Jones, Letchworth : herbaceous plants.
Messrs. Kelway, Langport : Pæonies.
Messrs. Low, Enfield : Rose ' Jarvisbrook.'
C. H. Palmer, Esq., Whitchurch : Carnation ' Mrs. Charles H. Palmer.'
Mr. A. Perry, Enfield : Iris ' Doubractifor.'
Messrs. Seaman, Staines : Lobelia ' Wedgewood.'
Mr. S. Sims, Draycott : herbaceous plants.
F. C. Stoop, Esq., Byfleet : Carnation ' Bertha Stoop.'
Messrs. Tucker, Oxford : herbaceous plants.
Messrs. Wood, Taplow : *Mimulus cardinalis* ' Sunset.'
A. Worsley, Esq., Isleworth : *Cereus amecaensis* × *Coopermanni.*
G. Yeld, Esq., Gerrard's Cross : Iris ' Vesper.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other bulbous plants.

Banksian Medal.

To Mr. Gavin Jones, Letchworth, for alpine plants.
To Messrs. Maxwell & Beale, Broadstone, for alpine plants.
To Mr. J. Robinson, New Eltham, for alpine plants.

To Messrs. Rogers, Southampton, for alpine plants.
To Messrs. Waterer, Twyford, for alpine and herbaceous plants.
To Mr. F. G. Wood, Ashtead, for alpine plants.

Award of Merit.

To *Eremurus Bungei* var. ' Highdown Gold ' as a hardy flowering plant (votes unanimous), from Major F. C. Stern, Goring. A handsome variety with towering racemes of rich golden flowers, shaded and suffused with orange.

To Escallonia ' Donard Brilliance ' as a hardy flowering shrub (votes 10 for, 2 against), from the Donard Nursery Co., Co. Down. A valuable, dark red-flowered variety of lax growth, reaching a height of 8 feet. ' Donard Brilliance ' was raised from a cross between *E. langleyensis* and an unnamed seedling.

To *Pentstemon glaber* as a hardy flowering plant (votes 8 for, 3 against), from Viscountess Byng of Vimy, Thorpe-le-Soken. A herbaceous species attaining a height of 1½ to 2 feet. The erect, leafy stems bear long racemes of lilac-blue, tubular flowers 1 inch long.

To *Platytheca galioides* as a tender flowering shrub (votes unanimous), from Messrs. Low, Enfield. This was exhibited under the more common name *Tremandra verticillata.* It is a slender, branched plant with whorls of linear leaves and a profusion of small, violet flowers.

To *Rhododendron* ' Sheila Osborn ' as a hardy flowering shrub (votes unanimous), from the Director, Royal Botanic Gardens, Kew. A useful, late-flowering hybrid of *R. discolor* and *R.* ' Strategist.' The widely expanded blossoms are rose-pink in colour, slightly darker externally.

Other Exhibits.

C. Hiatt Baker, Esq., Almondsbury : *Onosma* sp.
Viscountess Byng of Vimy, Thorpe-le-Soken : *Phacelia tanacetifolia, Gilia achilleaefolia, Pentstemon glaber* Byng's variety.
Central Garden Supplies, Kenton : alpine plants.
Misses Hopkins, Coulsdon : alpine plants.
Major Johnston, Campden : *Mimulus alpinus,* Cyrtanthus ' Pink Beauty,' *Oxalis* spp.
Sir Wm. Lawrence, Bt., Burford : *Mimulus alpinus.*
Merivale Nurseries, Chelmsford : alpine plants.
Major Pam, Broxbourne : *Philadelphus splendens, Oenothera odorata.*
Mr. Amos Perry, Enfield : *Aponogeton abyssinicus, Lapeyrousia grandiflora.*
Messrs. Prichard, Christchurch : *Verbascum* sp.
Mr. G. Reuthe, Keston : *Rhododendron cinnabarinum.*
Messrs. Russell, Richmond : *Lilium sutchuenense.*
Mr. S. Sims, Draycott : alpine plants.
Messrs. Stewart, Ferndown : *Lilium concolor sinicum.*

FLORAL COMMITTEE, JUNE 26, 1928.

Section A.

AT THE AMATEURS' SHOW.

Mr. H. B. MAY, V.M.H., in the Chair, and sixteen other members present.

Award Recommended :—

Award of Merit.

To Carnation ' Margot Holmes ' as a variety for cutting (votes unanimous), from Mrs. Carl Holmes (gr. Mr. W. J. Penton), Welwyn. A large, well-formed, perpetual-flowering variety with a very pronounced clove scent. The colour is a light mauve-pink.

Selected for trial at Wisley.

Delphinium ' Hans Hamilton,' from G. C. Hans Hamilton, Esq., Claygate.

Other Exhibits.

W. B. Cranfield, Esq., Enfield : Pæony ' Emperor.'
M. Fenwick, Esq., Stow-on-the-Wold : Mimulus ' Abbotswood.'
R. W. Spicer, Esq., Alton : Viola ' Mrs. Spicer.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and sixteen other members present.

Awards Recommended :—

Award of Merit.

To *Choananthus Wollastonii* as a flowering plant for the greenhouse (votes unanimous), from Dame Alice Godman, Horsham. A handsome greenhouse plant. The clusters of glossy, dark green leaves attain a height of nearly 3 feet, partially concealing the umbels of pendent, bright red, tubular flowers. The plant was collected in bamboo forest at an altitude of 8000 feet on Ruwenzori.

To *Ursinia anethoides* as a half-hardy annual flowering plant (votes unanimous), from T. Hay, Esq., Hyde Park. A new and easily grown plant for the garden or greenhouse. It is free-flowering and useful for cutting. The golden-yellow flower-heads are carried singly on long slender stalks.

Other Exhibits.

Dame Alice Godman, Horsham : *Alyssum* sp.
J. J. Joicey, Esq., Witley : *Reichsteinera tuberosa.*

ORCHID COMMITTEE.

JANUARY 3, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and ten other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for winter-flowering hybrids.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for species and hybrids.

Banksian Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Cypripedium hybrids.

Vote of Thanks.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for group.

To Martin F. Hitchins, Esq., Trevarrick, St. Austell, Cornwall, for a cut spike of *Odontioda* × ' St. Agnes ' (*Oda.* × ' Scarlet Pimpernel ' × *Odm.* × ' Jupiter '), with bright red spotting.

Award of Merit.

To *Odontonia* × ' Aglaon ' (*Odm.* × ' Aglaon ' × *Odontonia* × ' Thais ') (votes 7 for, 3 against), from Messrs. Charlesworth. Flowers large, sepals and petals crimson-purple, the expansive labellum light rose with purplish markings.

Cultural Commendation.

To Messrs. Charlesworth, for *Odontoglossum* × ' Terentia ' with a branching spike of 80 flowers.

Other Exhibits.

Messrs. A. J. Keeling, Bradford: F.C.C. variety of *Dendrobium* × ' Lady Colman,' and other hybrids.

Messrs. Black & Flory, Slough : Cypripedium hybrids.

Messrs. McBean, Cooksbridge, Sussex: *Cymbidium* × ' Evelyn,' with greenish-yellow flowers.

ORCHID COMMITTEE, JANUARY 17, 1928.

F. J. HANBURY, Esq., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Sanders, St. Albans, for species and hybrids.
To Messrs. Charlesworth, Haywards Heath, for hybrids.
To S. G. Brown, Esq., Shepperton-on-Thames, for species and hybrids.

Silver Banksian Medal.

To Messrs. Cowan, Southgate, for a group.
To Messrs. McBean, Cooksbridge, for hybrids.
To Messrs. Armstrong & Brown, Tunbridge Wells, for species and hybrids.

Award of Merit.

To *Odontoglossum* × ' Toreador ' var. ' Ursula ' (' Laurentia ' × *crispum* var. ' Linda ') (votes unanimous), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. Flowers round, white with a reddish blotch on each sepal and spotting of similar colour on the petals.

To *Cypripedium* × ' Bedouin ' var. *aureum* (' Lord Wolmer ' × ' Swallow ') (votes unanimous), from F. J. Hanbury, Esq. The round dorsal sepal has a greenish base and a white upper area, the whole marked with vertical lines of small spots. Petals drooping, yellowish, with dark median line.

To *Odontonia* × 'Amoena' (*Odontonia* × 'Baroness Schröder' × *Odontoglossum* × 'St. James') (votes unanimous) from Messrs. Charlesworth. Flowers deep-rose with some reddish markings at the base of each segment.

Cultural Commendation.

To Mr. G. H. Wright, gardener to Mrs. Walter Burns, North Mymms Park, Hatfield, Herts, for *Cymbidium* × 'Moira,' with five spikes, each bearing from twenty to twenty-five large flowers.

Other Exhibits.

Mr. Harry Dixon, Wandsworth Common: various Orchids.
Messrs. Sutton Bros., Hassocks: various hybrids.
J. J. Joicey, Esq., The Hill, Witley: *Cypripedium* × 'Mary Joicey,' deep rose-pink.
Lady Aberconway and the Hon. H. D. McLaren, Bodnant, N. Wales: *Cymbidium* × 'Pandora' ('Capella' × 'Castor'), light greenish with rose markings.
Messrs. A. J. Keeling & Sons, Bradford: various Cypripedium hybrids.
Messrs. H. G. Alexander, Ltd., Tetbury, Glos.: elegant Cypripedium hybrids.

ORCHID COMMITTEE, JANUARY 31, 1928.

C. J. LUCAS, Esq., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrids.
To Messrs. Sanders, St. Albans, for species and hybrids.

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for various hybrids.
To Messrs. Cowan, Southgate, for species and hybrids.

Award of Merit.

To *Cypripedium* × 'Jungfrau' ('Miss Audrey Locke' × 'Christopher' var. 'Grand Duke Nicholas') (votes 8 for, 2 against), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. Flower large, dorsal sepal white, with greenish base, and a few scattered spots; petals yellowish and waved at the edge.

Other Exhibits.

Messrs. Stuart Low, Jarvis Brook: various species and hybrids.
Mr. Harry Dixon: various Orchids.
Baron Bruno Schröder, Englefield Green: *Miltonia* × 'Lycaena' and *Cypripedium* × 'Sophocles.'
Gus Mayer, Esq., Woldingham: *Odontoglossum* × 'King George V' and other hybrids.
S. G. Brown, Esq., Shepperton: *Cymbidium* × 'Erica' var. 'Alicia.'

ORCHID COMMITTEE, FEBRUARY 14, 1928.

C. J. LUCAS, Esq., in the Chair, and eighteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. McBean, Cooksbridge, Sussex, for species and hybrids.
To Messrs. Sanders, St. Albans, for Cymbidiums.
To Capt. Maldwin Drummond, Cadland Park, Southampton, for Cymbidiums.
To Messrs. Charlesworth, Haywards Heath, for species and hybrids.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, Sussex, for various Orchids.
To Lady Hadden, Rossway, Berkhamstead, for Calanthe hybrids.
To Messrs. Cowan, Southgate, for Cymbidiums and Cattleyas.

Banksian Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for various Orchids.
To Messrs. Black & Flory, Slough, for various hybrids.

Award of Merit.

To *Cymbidium* × 'Erica Sander,' Wyld Court var. (*grandiflorum* × *Pauwelsii*) (*nem. con.*), from Sir William Cooke, Bt., Wyld Court, Hampstead Norris, Newbury, Berks. Spike of seventeen large flowers, light greenish, the labellum whitish, with reddish spots on the front lobe.

To *Cattleya* × 'Remy Chollet' var. 'Bruges' (*Trianae* × 'Monarch') (votes unanimous), from Messrs. Sanders. A large flower of rosy-mauve colour, the petals unusually broad, the labellum rich purple with much yellow in the throat area.

To *Cymbidium* × 'Lilian Sander' var. *aureum* ('Erica Sander' × *insigne*) (votes unanimous), from Messrs. Sanders. Spike of eight flowers of light yellow colour, the labellum, 1½ inch wide, has a few crimson spots on the front lobe.

To *Odontoglossum* × *ardentissimum xanthotes* var. *perfecta* (*crispum* var. *xanthotes* × *Pescatorei album*) (votes unanimous), from Messrs. Charlesworth. Spike of nine thick-textured flowers, pure white except for a yellow crest area and two yellow spots on the lip.

To *Sophrocattleya* × 'Clarinda' var. *gloriosa* (*S.-c.* × 'Atreus' × *C.* × 'Empress Frederick') (votes unanimous), from Messrs. Black & Flory. Flower of medium size, old-rose colour with a slight purplish tinge, the throat bright-yellow.

To *Odontoglossum* × 'Thetis' ('Dusky Monarch' × 'Solon') (votes 8 for), from Messrs. McBean, Cooksbridge, Sussex. Spike of seven large flowers, the sepals and petals crimson-maroon, with a narrow white margin, the labellum with a large blotch of similar colour.

Cultural Commendation.

To Mr. C. V. Kent, Orchid grower to Ernest R. Ashton, Esq., Broadlands, Tunbridge Wells, for *Lycaste* × *Balliae*, with seventeen flowers.

To Messrs. McBean, for *Cattleya Trianae*, with three leading growths and well-developed flowers.

Other Exhibits.

Mr. Harry Dixon, Wandsworth Common: various Orchids.
Robert Paterson, Esq., Ardingly, Sussex: *Cypripedium* × 'Robert Paterson.'
Messrs. H. G. Alexander, Tetbury, Glos.: Cymbidium hybrids.
Dr. Craven Moore, Manchester: *Odontoglossum* × *tyntesfieldense*.
Messrs. A. J. Keeling & Son, Westgate Hill, Bradford: Cymbidiums and Cypripediums.
Mr. John Evans, Colwyn Bay: Odontoglossums and Cypripediums.
F. J. Hanbury, Brockhurst, East Grinstead: *Dendrobium* × 'Gatton Monarch' and *D.* × *chessingtonense*.
J. J. Joicey, Esq., Witley, Surrey: *Lycaste* × 'Phoebe' (*candida* var. *Lawrenceana* × *macrobulbon*).
Baron Bruno Schröder, Englefield Green, Surrey: cut spikes of *Calanthe* × 'Baron Schröder.'

ORCHID COMMITTEE, FEBRUARY 28, 1928.

C. J. LUCAS, Esq., in the Chair, and sixteen other members present.

Awards Recommended :—

Gold Medal.

To Mrs. Walter Burns, North Mymms Park, Hatfield, for group of Cymbidium hybrids.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for Cymbidiums.
To Messrs. Charlesworth, Haywards Heath, for hybrids.
To Messrs. Stuart Low, Jarvis, Brook, for species and hybrids.

Banksian Medal.

To Mr. Harry Dixon, Wandsworth Common, for Orchids.
To Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.

Award of Merit.

To *Cymbidium* × *Pauwelsii* var. 'Croesus' (*Lowianum* × *insigne*) (votes 10 for, 1 against), from Sir Wm. Cooke, Bt., Wyld Court, Hampstead Norris. A fine specimen with three spikes averaging twenty flowers on each, greenish-cream suffused with pink, the lip lighter with crimson-brown markings.

To *Laeliocattleya* × 'Gwendolen Leach' ('Capulet' × 'Merciana') (votes unanimous), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. The plant bore an erect spike of flowers, golden-yellow, the lip ruby-crimson.

Other Exhibits.

Major Pam, Wormley Bury, Broxbourne: two forms of *Orchis longibracteata*.

Messrs. McBean, Cooksbridge: several hybrids.

Messrs. A. J. Keeling, Bradford: Odontiodas and *Burrageara* × 'Windsor.'

Messrs. Black & Flory, Slough: Cypripediums.

Sir Jeremiah Colman, Bt., Gatton Park, Surrey: a pleasing hybrid between *Cattleya* × *Cowaniae* and *Brassocattleya* × 'Golden Lily.'

Messrs. Cowan, Southgate: *Cattleya* × 'Tityus' var. *gloriosa*.

E. de Quincey, Esq., Chislehurst: a cut spike of an unnamed Cymbidium hybrid.

ORCHID COMMITTEE, MARCH 13, 1928.

F. J. HANBURY, Esq., in the Chair, and thirteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for group.

To Messrs. Sanders, St. Albans, for Cymbidium hybrids.

Silver-gilt Banksian Medal.

To Messrs. Cowan, Southgate, for various hybrids.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, Sussex, for species and hybrids.

To Messrs. Charlesworth, Haywards Heath, Sussex, for group.

Banksian Medal.

To Mr. Harry Dixon, Wandsworth Common, for Orchids.

To Messrs. Sutton Bros., Hassocks, for Orchids.

Award of Merit.

To *Cymbidium insigne* var. 'Mrs. Carl Holmes.' Flowers of deep-rose colour, the lip marked with reddish-crimson. Shown by Mrs. Carl Holmes, The Node, Welwyn, Herts.

To *Cymbidium* × 'Landrail' var. 'Ophir' ('Dryad' × *Lowianum*) (votes unanimous), from Robert Paterson, Esq., Stonehurst, Ardingly, Sussex. Flowers large, fawn-yellow, the labellum having a crimson margin on the front lobe.

To *Brassocattleya* × 'Sindoro' (*B.-c.* × *Vilmoriniana* × *C.* × 'Empress Frederick') (votes unanimous), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. Flowers large and of bright rosy mauve, the labellum with a golden centre and fringed margin.

To *Catasetum Christyanum* var. *nigrum*, from Messrs. Charlesworth. A remarkable species from the Amazon country. This variety appears much darker than that figured in the *Botanical Magazine*, t. 8007.

To *Cymbidium* × 'Letty' var. 'Exbury' (*Gottianum* × 'Merlin') (votes unanimous), from Lionel de Rothschild, Esq., Exbury, Southampton. A charming hybrid, light greenish-cream, the labellum whitish, tinged with rose-pink and having a crimson apex to the median lobe.

Cultural Commendation.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Odontoglossum* × 'Belenus,' with a branched inflorescence of forty-six flowers.

Other Exhibits.

Messrs. Black & Flory, Slough: *Cattleya* × 'Dr. M. Lacroze,' and other hybrids.

F. J. Hanbury, Esq.: *Dendrobium primulinum* and *Odontioda* × 'Juno.'

ORCHID COMMITTEE, MARCH 27, 1928.

F. J. HANBURY, Esq., in the Chair, and thirteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. H. G. Alexander, Ltd., Tetbury, Gloucester, for Cymbidiums.

Silver-gilt Banksian Medal.

To Messrs. Sanders, St. Albans, for group of Orchids.

Silver Banksian Medal.

To Messrs Stuart Low, Jarvis Brook, Sussex, for group of species and hybrids.
To Messrs. Charlesworth, Haywards Heath, Sussex, for group of Orchids.
To Messrs. Armstrong & Brown, Tunbridge Wells, for various Orchids.
To Messrs. Cowan, Southgate, London, N., for group of hybrids.

First-class Certificates.

To *Cymbidium* × 'Rosanna' var. 'Magnolia' ('Kittiwake' × *Alexanderi*) (votes 7 for, 3 against), from Messrs. H. G. Alexander. Flowers large, sepals and petals white suffused with rose, labellum with crimson markings on the central area.

Award of Merit.

To *Cymbidium* × 'Ceres,' Wyld Court var. (*insigne* × *I'Ansonii*) (votes *nem. con.*), from Sir William Cooke, Bart., Wyld Court, Hampstead Norris. The large flowers have much crimson-red suffusion and darker venation. Labellum cream-coloured, with reddish spots on the front lobe.

To *Odontioda* × 'Grenadier' var. 'The Node' ('Chantecler' × *Sanderae*) (votes *nem. con.*), from Mrs. Carl Holmes, Welwyn, Herts. A round flower of red-crimson.

To *Cymbidium* × 'Eagle' var. 'Excelsior' (*Gottianum* × *Alexanderi*) (votes unanimous) from Messrs. H. G. Alexander. Flowers large and well-formed, white, the labellum with crimson markings on the front lobe.

Preliminary Recognition.

To *Odontoglossum* × 'Norba' (*Rossii* × 'Mars'), from Mrs. Carl Holmes, Welwyn, Herts. Flowers resembling the Rossii parent, the dark purplish colour of the petals being a prominent feature.

Cultural Certificate.

To Mr. S. Farnes, orchid grower to F. J. Hanbury, Esq., East Grinstead, for *Dendrobium Victoriae reginae*, Brockhurst var.

ORCHID COMMITTEE, APRIL 11, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To J. J. Bolton, Esq., Claygate, Surrey, for group of *Dendrobium* × *Thwaitesiae*, and *D.* × *Austinii.*

Silver Lindley Medal.

To Mr. S. Lyne, orchid grower to J. J. Bolton, Esq., Claygate, Surrey, for well-cultivated Dendrobiums.

Silver-gilt Banksian Medal.

To Messrs. Sanders, St. Albans, for a group.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, Sussex, for species and hybrids.
To Messrs. Charlesworth, Haywards Heath, Sussex, for a group.
To Messrs. John Cowan, Southgate, for hybrids.

First-class Certificate.

To *Odontoglossum crispum* var. 'Carl Holmes' (votes unanimous), from Mrs. Carl Holmes, The Node, Welwyn, Herts. One of the finest varieties, flowers large, the petals remarkably well developed, pure white, the sepals tinged with rose.

Award of Merit.

To *Odontioda* × 'Rubicon' (*Oda.* × 'Coronation' × *Odm.* × 'Mars') (votes unanimous), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. Spike of five round flowers, of bright crimson colour, the labellum with a yellow crest.

To *Odontioda* × 'Van Eyck' (*Oda.* × 'Coronation' × *Odm.* × hybrid) (votes 8 for, 2 against), from J. J. Bolton, Esq., Claygate, Surrey. The spike bore nine large flowers of plum-purple colour, the labellum displaying some of the rose-ground colour.

Cultural Commendation.

To Mr. W. J. Penton, orchid grower to Mrs. Carl Holmes, The Node, Welwyn, for *Angraecum sesquipedale*, a well-cultivated plant with nine large, wax-like flowers.

Other Exhibits.

Baron Bruno Schröder, Englefield Green: *Sophrolaeliocattleya* × 'Tokio' and *Cymbidium* × *Shillianum*.

Robert Paterson, Esq., Ardingly: *Brassocattleya* × 'Princess Patricia,' Stonehurst variety, with two handsome flowers.

ORCHID COMMITTEE, APRIL 24, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and ten other members present.

The Chairman referred to the great loss which the Committee had sustained by the death of Mr. CHARLES J. LUCAS, Warnham Court, Horsham, and a Vote of Condolence with his relatives was carried unanimously.

No awards were recommended, the exhibits being very small on account of the Ghent Quinquennial Exhibition.

Mrs. Carl Holmes, The Node, Welwyn, Herts: *Calanthe striata* var. 'Butterfly.'

Mr. Harry Dixon staged *Cirrhopetalum Collettii*.

ORCHID COMMITTEE, MAY 8, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen other members present.

Awards Recommended:—

First-class Certificate.

To *Miltonia* × 'Lucia' Paterson's var. (*vexillaria* × 'Princess Margaret') (votes 9 for, 4 against), from Robert Paterson, Esq., Ardingly, Sussex. The blush sepals have rosy veins, the petals are ruby-red with a rosy margin, the labellum blush white at the margin, rosy in the centre, while the mask is red-brown.

Award of Merit.

To *Odontioda* × 'Brockhurst,' Stonehurst var. (*Oda.* × *Charlesworthii* × *Odm.* × *eximium*) (votes unanimous), from Robert Paterson, Esq. Flowers deep crimson-brown, the apex of the labellum lighter and the crest yellow.

Preliminary Recognition.

To *Odontonia* × 'Windsor' (*Odm.* × 'Trident' × *Miltonia* × 'Wm. Pitt') (votes unanimous), from Messrs. Black & Flory, Slough. Deep purplish-rose heavily marked with red, the labellum with a mask-like blotch at the base.

Cultural Commendation.

To Mr. J. E. Shill, Orchid grower to Baron Bruno Schröder, Englefield Green, Surrey, for *Miltonia* × 'Princess Mary,' with five spikes of flowers.

To Mr. A. Merry, Orchid grower to Robert Paterson, Esq., for *Laeliocattleya* × *Hassallii alba*, with eight flowers.

Orchid Committee.

Chelsea Show, May 23, 1928.

Sir Jeremiah Colman, Bt., in the Chair, and eighteen other members present.

Awards Recommended :—

First-class Certificate.

To *Laeliocattleya* × 'Invicta' (*L.-c.* × 'Labiosa' × *L.-c.* × 'Momus') (votes unanimous), from Messrs. Stuart Low, Jarvis Brook, Sussex. The segments are well developed, rich rosy purple, the labellum with deep purple around the margin and dull orange in the throat.

To *Bulbophyllum Binnendijkii* (votes unanimous), from Sir Jeremiah Colman, Bt., Gatton Park, Reigate. A remarkable species from Borneo. The eight flowers, borne in an umbel, were light greenish with dark purple markings, the lip suffused with purple on a white ground.

To *Odontioda* × 'Gloriosa' var. 'Mrs. R. F. Felton' (*Oda.* × 'Coronation' × *Odm.* × *amabile*) (votes 12 for), from Messrs. Armstrong & Brown, Tunbridge Wells. The spike bore ten large flowers, white, with reddish markings on the centre of the petals.

To *Odontoglossum crispum* var. 'Harvest Moon' (votes 10 for, 5 against), from Messrs. McBean, Cooksbridge, Sussex. A garden-raised form which received A.M. at the Chelsea Show, 1924. The spike bore ten roundly formed flowers entirely unspotted.

To *Odontoglossum* × 'Mona' var. 'Regina' ('Aphrodite' × 'Aglaon') (votes 13 for), from Messrs. Cowan, Southgate. The spike bore four large flowers of red-brown colour, the labellum whitish and with a large central blotch of red-brown.

To *Miltonia* × 'Mona' ('St. André' × *Charlesworthii*) (votes 13 for), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. The spike bore five large flowers, the sepals and petals rich reddish-rose, the labellum deep rose, with a maroon-coloured blotch at the base, on the outer side of which is a semi-circular white zone.

To *Odontioda* × 'Murillo' var. 'The Duchess' (*Oda.* × 'Chantecler' × *Odm.* × 'Aglaon') (votes 16 for), from Mrs. Robert Paterson, Ardingly, Sussex. A showy hybrid with a spike of twenty-four flowers of bright scarlet-red colour.

Award of Merit.

To *Cymbidium* × 'Joy Sander' var. 'Orbis' ('Ceres' × *Pauwelsii*) (votes 16 for), from Messrs. Sanders, St. Albans. Spike of nine flowers, greenish-buff, the labellum white with red markings on the front lobe.

To *Odontioda* × *majestica* var. 'Brilliant' (*Oda* × 'Coronation' × *Odm.* × *majesticum*) (votes 13 for), from Messrs. Cowan. Spike of thirteen large flowers, rose-coloured with reddish blotching on the central area of each segment.

To *Odontoglossum* × 'Camilla' var. 'Empress' ('Penelope' × 'Georgius Rex') (votes 13 for, 1 against), from Robert Paterson, Esq., Ardingly, Sussex. Spike of twelve flowers, with reddish blotching on a rosy ground

To *Odontoglossum crispum* var. 'Pearl McBean' (votes 13 for), from F. J. Hanbury, Esq. Flowers of excellent form, white, with slight rose tint on the lateral sepals.

To *Laeliocattleya* × 'Mrs. Chamberlain Chandler' (*L.-c.* × 'Lustre' × *L. purpurata*) (votes 10 for 3 against), from F. J. Hanbury, Esq. Flowers large, with much rich purple colouring, especially in the labellum.

To *Odontoglossum crispum* var. 'The Tetrarch' (votes 12 for), from Messrs. Armstrong & Brown. The spike bore twelve white flowers, the labellum with a red-brown blotch.

To *Laeliocattleya* × 'Clarilaw' (*C. Schroederae* × *L.-c.* × 'Helius') (votes unanimous), from Messrs. Armstrong & Brown. Flowers of medium size, salmon-fawn, the labellum with some crimson markings.

To *Odontioda* × 'Picardie' (*Oda.* × *Graireana* × *Odm.* × *rosefieldense*) (votes unanimous), from Mons. H. Graire, Amiens, France. Spike of eight flowers, the sepals and petals soft scarlet, the labellum blush-white with a yellow crest.

Cultural Commendation.

To Mr. J. Collier, Orchid grower to Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for *Sarcopodium Lyonii* (*Dendrobium acuminatum*), with five spikes of bloom.

To Messrs. Charlesworth, Haywards Heath, for *Odontioda* × 'Monica' (*Brewii* × *Lambeauiana*), with a branched inflorescence of thirty-two flowers.

ORCHID COMMITTEE, JUNE 5, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To S. G. Brown, Esq., Brownlands, Shepperton, for group of Orchids.

Silver Banksian Medal.

To E. R. Ashton, Esq., Broadlands, Tunbridge Wells, for group of hybrids.
To Gus Mayer, Esq., Woldingham, Surrey, for hybrids.
To Messrs. Black & Flory, Slough, for various species and hybrids.
To Messrs. Charlesworth, Haywards Heath, for various Orchids.
To Messrs. Stuart Low, Jarvis Brook, Sussex, for a group.
To Messrs. Sanders, St. Albans, for uncommon species.
To Messrs. Cowan, Southgate, London, N., for group of *Miltonia* hybrids.

Award of merit.

To *Odontioda* × 'Maureen' var. 'Mavourneen' (*Odm. eximium* × *Oda.* × 'Chanticler') (votes 11 for, 1 against), from Lionel de Rothschild, Esq., Exbury House, Southampton. The spike bore 13 roundly formed flowers of intense scarlet colour.

To *Miltonia* × *gattonensis* (Bleuana × Charlesworthii) (votes 12 for), from Lionel de Rothschild, Esq. Segments flatly displayed, creamy-white, with a few colour markings on the base of the labellum.

To *Odontoglossum* × 'Golden Glory' (parentage unknown) (votes unanimous), from F. L. Hanbury, Esq., Brockhurst, East Grinstead, Sussex. Flowers white, with lemon-yellow blotches

Cultural Commendation.

To Mr. C. V. Kent, orchid grower to E. R. Ashton, Esq., Broadlands, Tunbridge Wells, for *Laeliocattleya* × 'Anaconda' with a spike of six well-developed flowers.

To Mr. A. Merry, orchid grower to Robert Paterson, Esq., Ardingly, Sussex, for *Cattleya* × 'Dr. M. Lacroze' with a spike of six large flowers.

ORCHID COMMITTEE, JUNE 19, 1928.

Sir JEREMIAH COLMAN, Bt., in the Chair, and twelve other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, Sussex, for species and hybrids.
To Messrs. Charlesworth, Haywards Heath, for hybrids.

First-class Certificate.

To *Dendrobium thyrsiflorum* var. *Galliceanum* (votes 11 for, 1 against), from Mrs. Carl Holmes, The Node, Welwyn, Herts. A showy variety with many-flowered pendulous racemes; the segments more open than in *D. thyrsiflorum*, sepals and petals white, lip shell-shaped, downy and orange-yellow.

Award of Merit.

To *Miltonia* × *Sanderiana* var. 'June' (*Bleuana* × 'St. André') (votes 9 for, 2 against), from Messrs. Black & Flory, Slough. Sepals and petals ruby-crimson, labellum rose-purple with a whitish area around the yellow crest.

To *Miltonia* × 'Lycaena' *gigantea* ('Princess Margaret' × 'Lord Lambourne') (votes unanimous), from Robert Paterson, Esq., Ardingly, Sussex. Flowers unusually large, white, the petals flushed with crimson at the base, the lip stained with rose on the central area and having a yellowish mask at the base.

To *Miltonia* × *gattonensis* var. 'Stonehurst' (*Bleuana* × *Charlesworthii*) (votes 9 for), from Robert Paterson, Esq., Flowers creamy-white, the labellum with a red-brown mask at the base.

Cultural Commendation.

To Mr. F. W. Thurgood, Orchid grower to S. G. Brown, Esq., Brownlands, Shepperton, for *Oncidium macranthum*, with a trailing spike of fifty-five flowers.

To Mr. S. Lyne, Orchid grower to J. J. Bolton, Esq., Claygate, Surrey, for *Odontoglossum crispum* var. 'Premier Disraeli,' with a spike of eleven large and roundly-formed flowers.

Other Exhibits.

Mrs. Carl Holmes: *Odontoglossum* × 'Boadicea' *magnificum*, with a spike of thirteen flowers.

S. G. Brown, Esq., Shepperton: *Cattleya Warscewiczii* var. 'Britain's Queen,' of delicate blush colour.

J. J. Bolton, Esq., Claygate, Surrey: *Cattleya* × *Hardyano-Warneri* var. 'Juno.'

Robt. Paterson, Esq.: *Odontoglossum* × 'Toreador' with small purplish spotting.

Messrs. Cowan, Southgate: various Odontoglossum and Odontioda hybrids.

Messrs. Sanders, St. Albans: *Aerides Fieldingii*, *Cattleya Warneri alba* and *Rhynchostylis retusa*.

ORCHID COMMITTEE, JUNE 26, 1928.

AMATEURS' SHOW.

Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for group of species and hybrids.

Lindley Medal.

To Frederick J. Hanbury, Esq., Brockhurst, East Grinstead, for *Dendrobium Victoria-reginae*, a finely grown and well-flowered specimen.

Award of merit.

To *Laeliocattleya* × 'Miss Faith H. Hanbury' (*L.* × 'Cinnabrosa' × *L.-c.* × *Canhamiana*) (votes 9 for, 2 against), from F. J. Hanbury, Esq., Brockhurst, East Grinstead. Flower spikes tall and erect, sepals yellowish, petals buff with light rose veining, labellum bright purple.

Cultural Commendation.

To Mr. Archibald Merry, orchid grower to Robert Paterson, Esq., Ardingly, Sussex, for *Laeliocattleya* × *Canhamiana alba superba*, with seven spikes and 22 flowers.

NARCISSUS AND TULIP COMMITTEE.

FEBRUARY 14, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eight other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. James Carter, Raynes Park, for Tulips.

Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips.

NARCISSUS AND TULIP COMMITTEE, FEBRUARY 28, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and ten other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Tulips and Daffodils.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

Banksian Medal.

To Mr. G. W. Miller, Wisbech, for Tulips and Daffodils.

NARCISSUS AND TULIP COMMITTEE, MARCH 13, 1928.

Mr. G. W. LEAK in the Chair, and fourteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for early-flowering Tulips.

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

Silver Banksian Medal.

To Messrs. Seymour Cobley, Spalding, for Daffodils.
To Messrs. J. R. Pearson, Lowdham, for Daffodils.
To Mr. J. L. Richardson, Waterford, for Daffodils.

Award of Merit.

To *Narcissus* 'Zionist,' for exhibition (votes 11 for, 1 against). Division I. (*b*). A white trumpet variety, but when the flower first opens the trumpet is pale primrose. Raised and shown by Mr. J. L. Richardson, Waterford.

NARCISSUS AND TULIP COMMITTEE, MARCH 27, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and twenty other members present.

Sporting in Daffodils.—It was reported that Mr. P. D. Williams had received a letter from an American correspondent who desired to have the Committee's opinion on the possibility of a daffodil sporting. The Secretary was instructed to say that sporting in daffodils was unusual but not unknown.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.
To Mr. J. L. Richardson, Waterford, for Daffodils.

Silver Banksian Medal.

To Messrs. J. R. Pearson, Lowdham, for Daffodils.
To Mr. F. A. Secrett, Twickenham, for Daffodils.
To Mr. Guy L. Wilson, Broughshane, for Daffodils.

Banksian Medal.

To the Donard Nursery Company, Newcastle, Co. Down, for Daffodils.
To Messrs. D. Stewart, Wimborne, for Daffodils.

Award of Merit.

To *Narcissus* 'Goviley,' for exhibition (votes 10 for, 4 against). Division III. (*b*). A bi-color *Barrii* variety of good texture, with a white perianth, and a small, flattened, frilled, reddish-orange, yellow-centred cup. Raised and shown by Mr. P. D. Williams, Lanarth, St. Keverne.

To *Narcissus* 'Trewirgie,' for exhibition (voting unanimous). Division VI. A *cyclamineus* hybrid, with large golden flowers of fine texture. The perianth segments were broad and slightly reflexed, while the trumpet was long and slightly recurved at the mouth. Raised and shown by Mr. P. D. Williams.

NARCISSUS AND TULIP COMMITTEE, APRIL 11, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and thirteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. J. L. Richardson, Waterford, for Daffodils.
To Messrs. R. H. Bath, Wisbech, for Daffodils.
To Mr. F. A. Secrett, Twickenham, for Daffodils
To Messrs. Barr, Covent Garden, for Daffodils.

Silver Banksian Medal.

To Messrs. Herbert Chapman, Rye, for Daffodils.

Banksian Medal.

To Messrs. D. Stewart, Wimborne, for Daffodils.
To Mr. W. F. M. Copeland, Southampton, for Daffodils.

Award of Merit.

To *Narcissus* 'Clwyd,' for exhibition (voting unanimous). Division III. (*b*) A bi-color *Barrii* variety, with a creamy-white perianth and a flattened, deep yellow cup edged with orange. Raised by the Brodie of Brodie and shown by Mr. R. F. Calvert, Coverack, Cornwall.

To *Narcissus* 'Bradwardine,' for exhibition (votes 11 for, 0 against). Division IV (*a*). A large-flowered *Leedsii* variety, with cream-coloured cup of medium size. Raised by the Brodie of Brodie and shown by Mr. R. F. Calvert.

To *Narcissus* 'Icilinda,' for exhibition (votes 10 for, 0 against). Division IV. (*a*) A *Leedsii* variety, with a large spreading, frilled, cream-coloured cup Raised and shown by Mr. W. F. M. Copeland.

To *Narcissus* 'Wide Wing,' for cutting (votes 11 for, 0 against). Selected for trial at Wisley as a market variety for cutting from the open. Division IX. A *Poeticus* variety, with broad white perianth segments of good substance and a small cup, yellow in the centre and orange-red at the margin. Raised by the Rev. G. H. Engleheart and shown by Mr. F. A. Secrett, Marsh Farm, Twickenham.

To *Narcissus* 'J. K. Ramsbottom,' for exhibition and for cutting (votes 10 for, 0 against). Selected for trial at Wisley as a market variety for cutting from the open. Division III. (*b*). A remarkably fine bi-color *Barrii* variety, with large perianth segments of the purest white and a brilliant orange flattened cup. Raised by Mr. P. D. Williams and shown by Mr. F. A. Secrett.

To *Narcissus* 'Holmdale,' for exhibition (votes 10 for, 0 against). Division IV. (*a*). A very refined *Leedsii* variety, with an exceptionally white cup almost as long as the perianth segments. Raised by Mr. F. H. Chapman and shown by Herbert Chapman, Ltd.

To *Narcissus* 'Beauty of Cambridge,' for exhibition (votes 11 for, 0 against). Division II. (*a*). A well-formed deep yellow *incomparabilis* variety, with a cup almost as long as the perianth segments. Raised and shown by Messrs. R. H. Bath, Wisbech.

To *Narcissus* 'Golden Goblet,' for exhibition (votes 12 for, 0 against). Division VII. A fine Jonquil hybrid, with a golden-yellow perianth and a trumpet of a slightly deeper shade. Raised by Messrs. van Tubergen and shown by Messrs. R. H. Bath.

NARCISSUS AND TULIP COMMITTEE, APRIL 17, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and twenty-two other members present.

The Peter Barr Memorial Cup.

It was unanimously recommended that the Peter Barr Memorial Cup be awarded to the Brodie of Brodie.

Awards Recommended :—

Gold Medal.

To Mr. W. B. Cranfield, Enfield Chase, for Daffodils.
To Messrs. Barr, Covent Garden, for Daffodils.
To Mr. F. A. Secrett, Twickenham, for Daffodils.

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils.
To the Donard Nursery Co , Co Down, for Daffodils.
To Mr. J L. Richardson, Waterford, for Daffodils.
To Mr. Guy L. Wilson, Broughshane, Co. Antrim, for Daffodils.
To Mr. L. van Leeuwen, Holland, for Daffodils.

Silver Banksian Medal.

To Mr. R. F. Calvert, Coverack, for Daffodils.
To Messrs J. R. Pearson, Ltd., Lowdham, for Daffodils.

Banksian Medal.

To Mr. G. W. Miller, Wisbech, for Daffodils.
To the Welsh Bulb Fields, St. Asaph, for Daffodils.
To Mr. J. W. Barr, Wimborne, for Daffodils.
To Messrs. H. Chapman, Rye, for Daffodils.
To Mr. H. G. Longford, Abingdon, for Daffodils.

Award of Merit.

To *Narcissus* 'Comrade,' for exhibition (voting unanimous). Division IV. (*a*). A *Leedsii* variety, with broad white perianth segments of good substance and a pale yellow cup. Raised and shown by Mr. William Welchman, Birdbeck House, Upwell, Wisbech.

To *Narcissus* 'Hades,' for exhibition (votes 13 for, 4 against). Division III. (*a*). This beautiful *Barrii* variety received a Certificate of Preliminary Recognition on April 15, 1925. Shown by Mr. J. L. Richardson, Waterford.

To *Narcissus* 'Red Sea,' for exhibition (votes 14 for, 3 against). Division III. (*a*). This variety received a Certificate of Preliminary Recognition on April 12, 1927. Shown by Mr. J. L. Richardson.

To *Narcissus* 'Silver Plane,' for exhibition (votes 10 for, 5 against). Division IV. (*b*). A *Leedsii* variety, with a pure white perianth and a flat yellow corona with a diameter equal to about one-third of the diameter of the flower. Raised in New Zealand by Mr. A. E. Lowe, and shown by the Donard Nursery Co.

To *Narcissus* 'Narrabri,' for cutting (votes 15 for, 1 against). Division IX. A *Poeticus* variety, with a white perianth of good substance and a small green-centred red-rimmed eye. Raised by Rev. G. H. Engleheart and shown by Mr. F. A. Secrett.

To *Narcissus* ' Red Rim,' for cutting (votes 17 for, 0 against). Division IX. This variety received an A.M. for exhibition on April 12, 1923, and a F.C.C. as a market variety on April 13, 1926. Shown by Mr. F. A. Secrett.

To *Narcissus* ' Quartz,' for exhibition (votes 14 for, 0 against). Division I. (*c*). A refined bi-color trumpet variety, with a cream-coloured trumpet. Raised by the Brodie of Brodie and shown by Herbert Chapman, Ltd.

To *Narcissus* ' Nissa,' for exhibition (votes 11 for, 5 against). Division II (*b*). A well-formed bi-color *incomparabilis* variety of good substance with smooth, broad, white perianth segments and a deep yellow cup of medium length. Raised by the Brodie of Brodie and shown by Herbert Chapman.

To *Narcissus* ' Copper Bowl,' for exhibition (votes 17 for, 0 against). Division II. (*a*). A well-formed *incomparabilis* variety, with a smooth yellow perianth and an orange cup of medium depth. Raised by the Brodie of Brodie and shown by Mr. Guy L. Wilson.

To *Narcissus* ' Mystic,' for exhibition (voting unanimous). Division IV. (*b*). A very dainty and refined flat-crowned *Leedsii* variety, with a white disc-like corona tinged with green in the centre and edged with a neat orange line. Raised and shown by Mr. Guy L. Wilson.

Varieties Selected for Trial.

The following varieties were selected for trial at Wisley :

Narcissus ' Folly.' Shown by Mr. P. D. Williams for garden decoration and as a market variety for cutting from the open.

Narcissus ' Narrabri.' Shown by Mr. F. A. Secrett as a market variety for cutting from the open.

It was recommended that a hybrid between *Narcissus juncifolius* and *N. triandus albus*, shown by Mr. J. S. Arkwright, be submitted to the Scientific Committee.

NARCISSUS AND TULIP COMMITTEE, APRIL 24, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nine other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

Silver Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils.

Banksian Medal.

To Mr. J. W. Barr, Wimborne, for Daffodils.
To Mr. G. W. Miller, Wisbech, for Daffodils.
To Messrs. D. Stewart, Ferndown, for Daffodils and Tulips.

Other Exhibits.

Three Daffodils and two Tulips were submitted for certificate, but no award was recommended. The Committee expressed a wish to see *Narcissus* ' Recessional ' and Tulip ' Pale Face ' again.

NARCISSUS AND TULIP COMMITTEE, MAY 8, 1928.

Mr. GEORGE MONRO in the Chair, and nine other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Tulips
To Messrs. Barr, Covent Garden, for Tulips.

Silver Banksian Medal.

To the Rev. Rollo Meyer, Watton Rectory, Hertford, for Tulips.
To the Welsh Bulb Fields, St. Asaph, for Tulips.

Banksian Medal.

To Messrs. D. Stewart & Son, Ferndown, for Tulips.

Award of Merit.

To Tulip 'Dipper,' for exhibition (votes 8 for, 0 against). The small shapely flower is of a deep maroon with a white base, the stem being about 30 inches in height. Raised and shown by Sir Daniel Hall, Merton, Surrey.

Varieties Recommended for Trial.

Narcissus 'Twin,' shown by Mr. H. Prins, Wisbech, was selected for trial at Wisley as a market variety.

Other Exhibit.

Narcissus 'Sea Shell' was shown by Mr. W. B. Cranfield, and the Committee expressed a desire to see it again in a fresher condition.

NARCISSUS AND TULIP COMMITTEE, MAY 22, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eight other members present.

There were no plants before the Committee

BOOKS AND PAMPHLETS PRESENTED, PURCHASED, OR REVIEWED DURING THE HALF-YEAR ENDING JUNE 30, 1928, AND DEPOSITED IN THE LIBRARY.

1 = Purchased.
2 = Sent for Review.
3 = Presented by Mr. C. E. Salmon.
4 = ,, ,, the Author.
5 = Lionel de Rothschild, Esq.
6 = Mr. H. B. May, V.M.H.
7 = Mr. H. D. McLaren.
8 = Miss M. Farley.
9 = Mr. G. Monro, C.B.E.
10 = Mr. A. J. Prior.
11 = Mr. H. T. Güssow.
12 = The National Rose Society.

Abbreviations.—Col. pls. = coloured plates; illus. = illustrated; rev. = revised; pls. = plates; ed. = editor, edited or edition; n.d. = no date; n.p. = no place (of publication given).

In the case of books published in London, the place of publication is not named in the entry.

Abbot, M. J. Bits of my garden shortly described. Illus sm. 4to. Bristol, 1884. (1)

Alderwerelt van Rosenburgh, C. R. W. K. van. Malayan ferns. 8vo. Batavia, 1909. (1)

Allioni, Carlo. Rariorum Pedemontii stirpium specimen primum. Pls. 4to. Turin, 1755. (1)

Allnutt, H. A system for cropping a kitchen garden. 8vo. [1871.] (1)

Amherst, Alicia, *afterwards Lady* **E. Cecil.** A history of gardening in England. 2nd ed. Illus. 8vo. 1896. (1)

Appel, Otto. The diseases of sugar beet. English edition. Ed. by R. N. Dowling. Transl. by C. Leslie Wood. Col. pls. 8vo. 1927. (2)

Ardoino, Honoré. Catalogue des plantes vasculaires qui croissent spontanément aux environs de Menton et de Monaco . . . 8vo. Turin, 1862. (1)

Austen, Ralph. A treatise of fruit trees. sm. 4to. Oxford, 1653. (1)

Babington, Charles Cardale. The British *Rubi*. 12mo. 1869. (1)

Baillon, Henri Ernest. Histoire des plantes. Monographie des Magnoliacées. Illus. 8vo. Paris, 1868. (1)

Baker, Mary Frances. Florida wild flowers. Illus. 8vo. New York. 1926. (1)

Banks, *Sir* **Joseph.** Catalogus bibliothecae. *See* Dryander, J.

Barlow, George. Gardening without worry. Simple and comprehensive information for the amateur gardener. Illus. 8vo. 1928. (2)

Barry, P. Barry's fruit garden. New ed. Illus. 8vo. New York, 1883. (1)

Bastien, Jean François. La flore jardinière, etc. Pls sm. 8vo. Paris, 1809. (1)

Bateson, Beatrice. WILLIAM BATESON, F.R.S., *Naturalist*, his essays and addresses, together with a short account of his life. Illus. 8vo. Cambridge, 1928. (2)

Battandier, J. A. Flore de l'Algérie. Supplément aux Phanérogames. 8vo. Paris & Algiers, 1910. (1)

[**Beeton, Samuel Orchart.**] Greenhouse and garden. A guide to plant culture (Beeton's Guides to good gardening). Illus. 8vo. n.d. (1)

Benzon, R. J. D. Fischer. *See* FISCHER-BENZON, R. J. D. von.

Berghuis, S. De Nederlandsche boomgaard . . . 2 vols. Col. pls. 4to. Groningen, 1868. (1)

Birkenhead, J. Ferns and fern culture. 3rd ed. rev. by F. PARSONS. Illus. 8vo. [1912]. (6)

——— ———(Another copy). (6)

Blatter, Ethelbert. Beautiful flowers of Kashmir. Vol. 1. Col. pls. 8vo. 1927. (2)

Bois, D., & Gadeceau, G. Les végétaux, leur rôle dans la vie quotidienne. 8vo. Paris, 1909. (1)

Borbás, Vinczé. *Dianthi* Hungarici [Transsilvanici] Schuriani, in herbario universitatis Leopolitanae asservati. (Termész. Füzetek, xii.) 8vo. [Budapest], 1889. (1)

——— Die ungarischen Nelken als Gartenpflanzen. (Termész. Füzetek, xii.) 8vo. [Budapest], 1889. (1)

——— Die im Lemberger Universitätsherbarium aufbewahrten siebenbürgischen Nelkenarten. (Termész. Füzetek, xii.) 8vo. [Budapest], 1889. (1)

——— Species *Dianthorum* Hungariae hortos exornantes. (Termész. Füzetek, xii.) 8vo. [Budapest], 1889. (1)

——— *Gypsophila digenea*, n. sp. hybr. et *G. arenariae* W. et Kit, var. *leiocládos* n. var. (Termész. Füzetek, xiii.) 8vo. [Budapest], 1890. (1)

——— *Mentha Frivaldszkyana* Borb. et species affines (Termész. Füzetek, xiii.) 8vo. [Budapest], 1890. (1)

——— *Quercus Budenziana* et species *Botryobalanorum*. (Termész. Füzetek, xiii.) 8vo. [Budapest], 1890. (1)

——— Species *Acerum* Hungariae atque Peninsulae Balcanae. (Termész. Füzetek, xiv.) 8vo. [Budapest], 1891. (1)

Borg, John. Cultivation and diseases of fruit trees in the Maltese Islands. 8vo. Malta, 1922. (1)

Bose, *Sir* **Jagadis Chunder.** The nervous mechanism of plants. Illus. 8vo. 1926. (2)

Brown, E. T. A year in my flower garden. Illus. 8vo. 1926. (2)

Brühl, Paul. A guide to the orchids of Sikkim. sm. 8vo. Calcutta & Simla, 1926. (1)

[**Brunfels, Otto.**] In Dioscoridis historiam . . . Illus. fol. Strasburg, 1543. (1)

Burgess, Edward Sandford. History of pre-Clusian botany in its relation to *Aster* (Mem. Torrey Bot. Club, x). 8vo. New York, 1902. (1)

Bussato, Marco. Giardino di agricoltura. Illus. sm. 4to. Venice, 1599. (1)

Camus, Aimée, & Camus, Edmond Gustave. Classification des saules d'Europe et monographie des saules de France. 2 vols and Atlas, 1–2. 8vo. and fol. Paris, 1904–5. (1)

Chamberlain, Edith L., & Douglas, Fanny. The gentlewoman's book of gardening. 8vo. 1892. (1)

Cheeseman, T. F. Manual of the New Zealand flora. 2nd ed. Edited by W. R. B. Oliver. 8vo. Wellington, N.Z., 1925. (1)

Chun, Woon-Young. *See* Nanking. National Southeastern University.

Comber, H. F. Field notes of plants collected by. *See* McLaren, H. D.

Combles, de. L'école du jardin potager . . . 3e éd. augm. du *Traité de la culture des pêchers* . . . et . . . la *Manière de semer en toute saison.* 2 vols. 8vo. Paris, 1780. (1)

Coventry, B. O. Wild flowers of Kashmir (Series II). Col. pls. 8vo. 1927. (2)

Cox, E. H. M. & Taylor, G. C. Primulas for garden and greenhouse) Illus. 8vo. 1928. (2)

Cox, Joseph F., & Starr, George E. Seed production and marketing. Illus. 8vo. New York, 1927. (2)

Croydon Natural History and Scientific Society. Proceedings and transactions. Feb. 18, 1902. to Jan 20, 1903. 8vo. Croydon, 1903. (3)

Daveau, Jules. Cistinées du Portugal. (Bot. Soc. Brot. iv.) 8vo. Coimbra, 1886. (1)

Day, Hilda G. A few flowers of the Italian Riviera, some notes and sketches from my diary. Col. pls. 8vo. 1927. (1)

Douglas, Fanny. *See* Chamberlain, E. L. The gentlewoman's book of gardening.

Dowling, R. N. *Ed.* *See* Appel, Otto.

Driver, A. & W. *See* Pomona Britanica The.

Dryander, Jonas. Catalogus bibliothecae historico-naturalis Josephi Banks. 5 vols. 8vo. 1798–1800. (1)

Egenolph, Christian. Plantarum, arborum, fruticum et herbarum effigies. . . . Col. illus. sm. 4to Frankfurt-a.-M., 1562. (1)

Engler, A. Das Pflanzenreich.
  91. Niedenzu, F. Malpighiaceae, Par. I. 1928. (1)
  92. Limpricht, W. Taccaceae. 1928. (1)

Farrow, E. Pickworth. The study of vegetation. 8vo. 1926. (2)

Fern Manual (The). By contributors to the *Journal of Horticulture.* Illus. 8vo. 1863. (1)

Finet, Eugène Achille, & Gagnepain, François. Contributions à la flore de l'Asie orientale. 2 vols. Illus. 8vo. Paris & Coulommiers, 1905–7. (1)

Fischer-Benzon, Rudolph J. D. von. Altdeutsche Gartenflora. 8vo. Kiel & Leipzig, 1894. (1)

Florist. The Christian florist . . . 2nd ed. 32mo. 1835. (1)

Flowers. The flowers of the year 16mo. [18—]. (1)

Focke, Wilhelm Olbers. Die Pflanzen-Mischlinge. 8vo. Berlin, 1881. (1)

Foerster, Karl. Vom Blütengarten der Zukunft. Illus. sm. 4to. Berlin, 1922. (1)

Fortuné, Henri. Des Violariées. Étude spéciale du genre *Viola.* Illus. 8vo. Montpellier, 1887. (1)

Fothergill, John. Memoirs of. *See* Lettsom, J. C.

——— The gardener's colour book. 4to. London & New York, 1927. (4)

Gadeceau, G. *See* Bois, D. Les végétaux.

Gaerdt, H. Die Winterblumen. Neue Ausgabe. Col. pls. Illus 8vo. Berlin, 1886. (1)

Gagnepain, François. *See* FINET, E. A. Flore de l'Asie orientale.

Geoponica. Libri de re rustica. sm. 8vo. n.p. 1528. (1)

Gibb, E. Hughes-. *See* HUGHES-GIBB, E.

[Gosse, Philip Henry.] Wanderings through the conservatories at Kew. Illus. sm. 8vo. [1856.] (1)

Gossip for the Garden, a handbook for the florist and suburban horticulturist. Conducted by E. S. DODWELL & JOHN EDWARDS. 2 vols. 8vo. 1856–57. (1)

Gough, Kathleen. A garden book for Malaya. Illus. 8vo. 1928. (2)

Graefer, John. A descriptive catalogue . . . of herbacious or perennial plants, etc. 8vo. [1789.] (1)

[Gravereaux, Jules.] La rose dans les sciences, dans les lettres et dans les arts. 8vo. [Paris], 1906. (1)

Green, J. Reynolds. A history of botany in the United Kingdom from the earliest times to the end of the 19th century. 8vo. 1914. (10)

Grey, Robert M. Report of the Harvard Botanical Gardens, Soledad Estate, Cienfuegos, Cuba (Atkins Foundation), 1900–1926. la.8vo. Cambridge, Mass., 1927. (2)

Griessen, A. E. P. Notes on civic arboriculture. (United Prov. Agr. Dept. Bull. 40.) Illus. 8vo. Allahabad, 1927. (4)

Grieve, *Mrs.* M. & Oswald E. Wild vegetables and salads and their vitamin values, etc. 8vo. Chalfont St. Peter [1926]. (2)

Groen, Jan van der. Den Nederlandsen hovenier, zijnde het I. deel het vermakelyk land-leven Illus. 4to. Amsterdam, 1711. (Engraved title bears the date 1696.) (1)

For Deel II. and III. of the series, *see* NYLANDT, P.

Gussone, Giovanni. Enumeratio plantarum vascularium in insula Inarime sponte provenientium vel oeconomico usu passim cultarum. Illus. 8vo. Naples, 1854. (1)

Güssow, H. T., & Odell, W. S. Mushrooms and toadstools. An account of the more common edible and poisonous fungi of Canada. Illus. 4to. Ottawa, 1927. (11)

Gustafson, A. F. Handbook of fertilizers, their sources, make-up effects and use. Illus. 8vo. New York, 1928. (1)

Hall, Harvey Monroe. Compositae of Southern California. (Univ Calif. Publ. Botany, iii.) 8vo. Berkeley, 1907. (1)

Hall, Thomas B. A flora of Liverpool. 8vo. [1839.] (1)

Halsham, John. Everyman's book of garden flowers. Illus. sm. 8vo. [1926]. (2)

Handel-Mazzetti, Heinrich. Naturbilder aus Südwest-China. Illus. 8vo. Vienna & Leipzig, 1927. (1)

Harada, Jiro. The gardens of Japan. Illus. 4to. 1928. (1)

Havart, Harry. The back-garden beautiful. Illus. 8vo. [18—]. (1)

Hayek, August von. Monographische Studien über die Gattung *Saxifraga*. I Die Sektion *Porphyrion* Tausch. (Denkschr. Akad. Wien, lxxvii.) Pls., maps. 4to. [Vienna, 1905.] (1)

Hayward, Joseph. An inquiry into the causes of the fruitfulness and barrenness of plants and trees. Illus. 8vo. 1834. (1)

Hermann, Paul. Horti Academici Lugduno-Batavi catalogus. Illus. 8vo. Leyden, 1687. (1)

——— Paradisus Batavus. [Ed. with a preface by W. SHERARD.] Illus. 4to. Leyden, 1705. (1)

Hibberd, Shirley. The town garden: a manual for the management of city and suburban gardens. 2nd ed. 8vo. 1859. (1)

Holman, Richard M., & Robbins, Wilfred W. A textbook of general botany for colleges and universities. 2nd ed. Illus. 8vo. New York, 1927. (2)

Holmes, T. C. Practical garden book. 2nd ed. 18mo. San Francisco, U.S.A. [1927.] (4)

Holmesdale Natural History Club.
Proceedings, 1881–83, 1899–1901, 1902–05, 1906–09. 8vo. London, Reigate, 1884–1910. (3)

Hopkinson, John. *See* PRYOR, A. R.

Hu, Hsen-Hsu. *See* NANKING. NATIONAL SOUTHEASTERN UNIVERSITY.

Hughes-Gibb, Eleanor. The life-force in the plant world or creative nature. Illus. 8vo. 1928. (2)

Hunger, F. W. T. CHARLES DE L'ESCLUSE (CAROLUS CLUSIUS) Nederlandsch kruidkundige, 1526–1609. Illus. la. 8vo. 's-Gravenhage, 1927. (1)

Icones Plantarum Sinicarum. *See* NANKING. NATIONAL SOUTHEASTERN UNIVERSITY.

Jackson, B. Daydon. [*Ed.*] *See* PRYOR, A. R.

Jackson, Benjamin Daydon. A glossary of botanic terms with their derivation and accent. 4th ed. 8vo. 1928. (2)

Jacquin, — *aîné* Mongraphie complète de melon, . . . Col. pls. 8vo. Paris, 1832. (1)

Jellicoe, G. A. *See* SHEPHERD, J. C. Gardens and design.

Johns, *Rev.* C. A. Flora sacra . . . 8vo. 1840. (1)

Jones, H. J. *See* RAVENSCROFT, B. C. Chrysanthemum culture.

Jones, Henry Albert, & Rosa, Joseph Tooker. Truck crop plants. 1st ed. Illus. 8vo. New York, 1928. (1)

King, *Mrs.* Francis. The beginner's garden. Illus. 8vo. New York. 1927. (2)

Knoche, Herman. Flora Balearica. Étude phytogéographique sur les Iles Baléares. 4 vols. Pls. 8vo. [Montpellier], 1921–23. (1)

Koch, Wilhelm Daniel Joseph. Synopsis florae Germanicae et Helveticae. 2nd ed. 3 vols. 8vo. Leipzig. 1843–45. (1)

———— 3rd ed. 1 vol. (in 2 pts.) 8vo. Leipzig, 1857. (1)

Kupper, Walter. Das Kakteenbuch. Illus. 4to. Berlin, 1928. (2)

L. A. E. The wild flowers of Clevedon. 8vo. Clevedon, 1877. (1)

L[aurent], J. Abrégé pour les arbres nains et autres. 12mo. Paris, 1683. (1)

Lemmon, Robert S. *See* WRIGHT, R. House and gardens.

L'Escluse, Charles de. *See* HUNGER, F. W. T.

Lettsom, John Coakley. Memoirs of JOHN FOTHERGILL. 4th ed. Ports. 8vo. 1786. (1)

Leyel, Hilda (*Mrs.* C. F.). The magic of herbs. 8vo. [1926]. (2)

Limpricht, W. Taccaceae. *See* ENGLER, A. Das Pflanzenreich, 92.

Lind, Gustaf. Elektrisk trädgårdsodling. (Med. K. Landtbruksak. Exp. Trädgardsavdelning, n. 25.) Illus. 8vo. Stockholm, 1928. (4)

Linden, Jean Jules. Hortus Lindenianus. Col. pls. 8vo. Brussels, 1859. (1)

London.

Royal Geographical Society. Permanent Committee on Geographical Names.
Nigeria and British Cameroons. 1928.
Serbs, Croats and Slovenes (Yugoslavia), North-west. 1928.
Persia (South). 1928.
Somaliland Protectorate. 1928.

McAlpine, Daniel. Life histories of plants. Illus. 8vo. [1886.] (3)

McIntosh, Thomas P. The potato, its history, varieties, culture and diseases. Illus 8vo. Edinburgh, 1927. (1)

McLaren, Henry D. [*Ed.*] Andes expeditions, 1925–6 and 1926–7. Field notes of plants collected by H. F. COMBER. sm. 8vo. [Edinburgh, 1928.] (7)

Macself, A. J. Plants from seed. Illus. 8vo. 1926. (2)

Major, Joshua & Son. The ladies' assistant in the formation of their flower gardens. Illus. 4to. 1861. (1)

Mangles, James. The floral calendar, . . . 8vo. 1839. (1)

Maris, K. E. Introductory science for botany students. Illus. 8vo. 1928. (2)

Martyn, Thomas. Catalogus horti botanici Cantabrigiensis. 8vo. Cambridge, 1771. (1)

—— Mantissa plantarum horti botanici Cantabrigiensis. 8vo. Cambridge, 1772. (1)

Matsumura, J. Shokubutsu Mei–i. Enumeration of selected scientific names of both native and foreign plants, with Romanized Japanese names, and in many cases Chinese characters. 8vo. Tokyo & Osaka, 1902. (1)

Maximowicz, Carl Johann. Diagnoses plantarum novarum Japoniae et Mandshuriae. 20 Dec. [in 1 vol.] (Mél. Biol. vi.–ix., ex Bull. Acad. Pétersb. x.–xxii.) 8vo. St. Petersburg, 1866–76. (1)

—— Diagnoses plantarum novarum Asiaticarum, 1–5. (Mél. Biol. ix.–xi., ex Bull. Acad. Pétersb. xxiii.–xxix.) 8vo. St. Petersburg, 1877–83. (1

—— —— 6–8. (Mél. Biol. xii., ex Bull. Acad. Pétersb. xxxi.–xxxii. 8vo. St. Petersburg, 1886–93. (1)

May, H. B. & Sons Catalogue of upwards of 2,000 species and varieties of ferns and selaginellas. Illus. la. 8vo. [1913 ?] (6)

—— ——(Another copy). (6)

May, W. J. Mushroom culture. 2nd ed. Illus. 8vo. 1904. (1)

Meikle, Andrew. Window gardening for town and country. 7th ed. 8vo. [187—.] (1)

Miethe, E. [*Ed.*] *See* SCHLECHTER, R. Die Orchideen.

Miyabe, Kingo, & Miyake, Tsutome. Flora of Saghalin (In Japanese.) Pls. 8vo. [Karafuto], 1915. (1)

Miyake, Tsutome. *See* MIYABE, K. Flora of Saghalin.

Moricand, Moise Etienne. Plantes nouvelles d'Amérique. Pls. 4to. Geneva, 1833–46. (1)

Morse, Richard. British wild fruits and how to identify them Illus. 8vo. 1927 (2)

Nanking.—

NATIONAL SOUTHEASTERN UNIVERSITY. COLLEGE OF AGRICULTURE. DEPARTMENT OF BOTANY.—Icones plantarum Sinicarum. Ed. by HSEN-HSU HU and WOON-YOUNG CHUN. Fasc. I. Pls. fol. Shanghai. 1927. (1)

National Rose Society. Handbook on the insect and fungus pests of the rose. New edition. By F. V. THEOBALD & J. RAMSBOTTOM. Col. pls. Illus. 8vo. 1925. (12)

Niedenzu, Franz. Malpighiaceae. *See* ENGLER, A. Das Pflanzenreich, 91.

Nietner, Th. Die Rose, ihre Geschichte, Arten, Kultur und Verwendung. . . . Col. pls. Illus. 4to. Berlin, 1880. (1)

Nylandt, Petrus. Den verstandigen hovenier, over de twaelf maenden van't jaer. Zijnde het II. deel van het vermakelyk lant-leven . . . 4to. Amsterdam, 1711. (Engraved title bears the date 1696.) (1)
For Deel I. of the series, *see* GROEN, J. VAN DER.

—— De medicyn-winkel, of ervaren huys-houder: zijnde het III. deel van het vermakelyk lant-leven . . . (Den naerstigen byen-houder . . . —De verstandige kok . . .) 4to. Amsterdam, 1711. (1)

Nylant, P. *See* NYLANDT, P.

Ostenfeld, C. H. Contributions to West Australian botany. 2 pts. (Dansk. Bot. Arkiv, ii., n. 6 & 8.) Illus. 8vo. Copenhagen, 1916–18. (1)

Palladius, Rutilius Taurus Aemilianus. PALLADIO dignissimo et antiquo scrittore della agricultura tradutto volgare . . .sm. 4to. Venice, 1528. (1)

Penzig, O. Pflanzen-Teratologie. 2nd ed. 3 vols. 8vo. Berlin, 1921–22. (1)

Pflantzbuchlin der Lustgaerten . . . Illus. sm. 8vo. Frankfurt-am-Main, 1562. (1)

Pigott, B. A. F. Flowers and ferns of Cromer and its neighbourhood. 8vo. 1885. (1)

Pomona Britanica, The, or, fruit-garden displayed . . . with a botanical lexicon. . . . By Several Hands. Rev. by A. & W. DRIVER. Col. pls. sm. 4to. 1788. (1)

Pryor, Alfred Reginald. A flora of Hertfordshire. [*Ed.*] . . . by B. DAYDON JACKSON, with an introduction on the geology, climate, botanical history, etc., of the county by J. HOPKINSON and the Editor. 8vo. 1887. (1)

Ramsbottom, John. *See* NATIONAL ROSE SOCIETY. Handbook on the insect and fungus pests of the rose.

Ravenscroft, B. C. Chrysanthemum culture for amateurs. 4th ed. re-written and brought up to date by H. J. JONES. Illus. 8vo. [1928.] (2)

Rehder, Alfred. The Bradley bibliography; a guide to the literature of the woody plants of the world, published before the beginning of the twentieth century. (Arnold Arboretum, Publn. 3.) Vol. 5. Index of authors and titles, subject index, 4to. Cambridge, Mass., 1918. (1)

Remington, John Stewart. Seed testing. Illus. 8vo. 1928. (2)

Rennie, James. The hand-book of gardening . . . 12mo. 1834. (1)

Revue Horticole. 1st ser. Vols. 1–3. Illus. 12mo. Paris, 1832–41. (1)

—— 2nd ser. Vols. 1–5. Col. pls. Illus. 12mo. Paris, 1841–46. (1)

Robbins, Wilfred W. Principles of plant growth. An elementary botany. Illus. 8vo. New York, 1927. (2)

Robley, Augusta J. A selection of Madeira flowers, drawn and coloured from nature. Col. pls. fol. 1845. (1)

Rockwell, F. F. The book of bulbs. Illus. 8vo. New York, 1927. (2)

Rogers, *Rev.* W. Moyle. An essay at a key to British *Rubi*. (Journ. Bot.) 8vo. 1893. (1)

Rohde, Eleanour Sinclair. Garden-craft in the Bible and other essays. 8vo. 1927. (2)

Rosa, J. T. *See* JONES, H. A. Truck crop plants.

Ross, David. Account of botanical rambles in the Pyrenees in August 1862. 8vo. Edinburgh, 1863. (1)

Scheer, Frederick. Kew and its gardens. 8vo. 1840. (1)

Scheuchzer, Johann Jacob. Bibliotheca scriptorum historiae naturali omnium terrae regionum inservientium. sm. 8vo. Zürich, 1716. (1)

Schlechter, Rudolf. Die Orchideen: ihre Beschreibung, Kultur und Züchtung. 2te Auflage herausg. von E. MIETHE. Illus. 8vo. Berlin, 1927. (1)

Shepherd, J. C., & Jellicoe, G. A. Gardens and design. Illus. fol. 1927. (2)

Sherard, W. [*Ed.*] *See* HERMANN, P.

Silva Tarouca, Ernst, *Count* & Schneider, Camillo [*Eds.*] Unsere Freiland-Stauden Anzucht, . . . 4th ed. Col. pls. Illus. 8vo. Vienna & Leipzig, 1927. (2)

Skene, Macgregor. Trees. 8vo. 1927. (2)

Solly, V. N. Gardens for town and suburb. Pls. la. 8vo. 1926. (2)

Starr, George E. *See* COX, J. F. Seed production and marketing.

Sutton & Sons. The culture of vegetables and flowers from seeds and roots. 17th ed. 8vo. 1926. (2)

Swartz, Olof. Observationes botanicae. Illus. 8vo. Erlangen, 1791. (1)

Taylor, G. C. *See* COX, E. H. M. Primulas.

Temple, James Graham. The Scotch forcing gardener. 8vo. Edinburgh, 1828. (1)

Thomas, H. H. [*Ed.*]. Garden handbook for beginners. Illus. 8vo. 1925. (1)

—— Allotment gardening. A complete guide. Illus. 8vo. 1926. (1)

—— [*Ed.*] Popular guide to gardening. 5th impr. Illus. 8vo. 1927. (1)

—— [*Ed.*] The garden month by month. Illus. 8vo. 1927. (1)

—— Greenhouse flowers and how to grow them. Illus 8vo. 1928. (2)

Thomson, *Rev.* R. Wodrow. The amateur's rosarium . . . Illus. 8vo. Edinburgh, 1862. (1)

Threlkeld, Caleb. Synopsis stirpium Hibernicarum. sm. 8vo. Dublin, 1727. (1)

Trelease, William. The Yucceae (13th Ann. Rep. Missouri Bot. Gard.) Illus. 8vo. [St. Louis], 1920. (1)

Tyas, Robert. Flowers and heraldry; or floral emblems and heraldic figures. Illus. 8vo. 1851. (1)

Wanderings through the conservatories at Kew. *See* GOSSE, P. H.

Ward, F. Kingdon. Field notes of plants, shrubs and trees, other than rhododendrons, collected by K. W. in 1924–25. sm. 8vo. n.p. [1926.] (5)

—— Field notes of the rhododendrons collected by K. W. in 1924–25. sm. 8vo. n.p. [1926.] (5)

Watson, W. Cactus culture for amateurs. Illus. 8vo. 1903. (8)

Watson, William. Rhododendrons and azaleas. Col. pls. 8vo. [1911.] (1)

Watts, Elizabeth. Flowers and the flower garden. With instructions on the culture of ornamental trees and shrubs, etc. 8vo. 1866. (1)

Weaver, John E. Root development of field crops. Illus. 8vo. 1926. (2)

Williams, Frederic Newton. Enumeratio specierum varietatumque generis *Dianthus*. 8vo. 1889. (1)

——— Notes on the pinks of Western Europe. 8vo. 1889. (1)

——— The pinks of Central Europe. 8vo. 1890. (1)

——— Note monographique sur le genre *Rhodalsine* Gay. (Bull. Herb. Boiss. vi.) Pl. 8vo. [Geneva], 1898. (3)

Williams, *Mrs.* Leslie. A garden in the suburbs. Illus. 8vo. 1901. (1)

Wilson, E. H. More aristocrats of the garden. Illus. 8vo. Boston, Mass., 1928. (1)

Wood, C. Leslie. *Transl.* *See* APPEL, OTTO.

Wood, Samuel. A plain guide to good gardening, or how to grow vegetables, fruits and flowers. 3rd ed. Illus. 8vo. 1879. (1)

Wright, Richardson, & Lemmon, Robert S. House and gardens, second book of gardens. Illus. 4to. New York, 1927. (9)

Wright, Walter P. Scientific and practical gardening for school and home. Illus. 8vo. [1928.] (1)

—— Roses and rose gardens. 3rd ed. Illus. 8vo. 1927. (2)

Printed in England at THE BALLANTYNE PRESS
SPOTTISWOODE, BALLANTYNE & CO. LTD
Colchester, London & Eton

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JULY 3, 1928.

Mr. W. B. CRANFIELD in the Chair.

One hundred and forty-one Fellows and one Associate were elected.

The Clay Challenge Cup for a new Rose possessing the true old Rose scent was not awarded.

A lecture was given by Mr. C. F. Langdon on " Delphiniums."

GENERAL MEETING.

JULY 17, 1928.

Dr. J. A. VOELCKER, M.A., F.I.C., F.L.S., in the Chair.

Ninety-two Fellows and five Associates were elected, and one Society affiliated.

A lecture was given by Dr. F. A. Hampton, M.A., B.Ch., on " Scented Flowers." (See p. 138.)

R.H.S. FRUIT COMPETITIONS FOR AMATEURS.

JULY 17, 1928.

Chief Awards.

Class 5.—Collection of Gooseberries.

First Prize, Silver Bunyard Medal and £4.
To C. G. A. Nix, Esq. (gr. Mr. E. Neal), Tilgate, Crawley, Sussex.

Class 20.—Collection of twelve dishes of fruits.

First Prize, Silver Hogg Medal and £6.
To C. G. A. Nix, Esq.

Second Prize, Bronze Hogg Medal and £3.
To Lord Swaythling (gr. Mr. F. J. Rose), Bitterne, Southampton.

GENERAL MEETING.*

JULY 31, 1928.

Major G. CHURCHER in the Chair.

Sixty-four Fellows and one Associate were elected, and one Society affiliated.

A lecture was given by Mr. J. Douglas on " Border Carnations."

---

* Under the Bye-laws incorporated in the new Charter granted July 9, 1928, the election of Fellows and Associates and the affiliation of kindred Societies proposed after that date take place at the meetings of the Council.

DEPUTATION TO HARROGATE.

AUGUST 10, 1928.

A deputation consisting of Mr. T. Hay, M.V.O., V.M.H., and Mr. L. G. Sutton, C.B.E., J.P., F.L.S., with the Secretary, visited the Harrogate Agricultural Society's Show at Harrogate and made the following awards :—

Gold Medal.

To the Corporation of Harrogate, for a mixed group.
To Messrs. A. Dickson, Newtownards, Co. Down, for Roses.
To Messrs. S. McGredy, Portadown, N. Ireland, for Roses.
To Messrs. Sutton, Reading, for a mixed group.

Silver Flora Medal.

To Major F. H. Fawkes (gr. Mr. E. M. Mutlow), Farnley Hall, Otley, for Apples in pots.

To Colonel C. F. Tetley, D.S.O. (gr. Mr. F. Owram), Kirkham Bank, Knaresborough, for a group of flowers, fruits, and vegetables.

Bronze Flora Medal.

To Mr. J. K. Woodmansey, Ye Olde Manor House, Knaresborough, for Ferns.

Silver Veitch Memorial Medal and £5.

To Dr. W. L. Spink and Mr. C. F. Spink, North Dene, Balmoral Avenue, Gt. Yarmouth, for a group of plants.

Bronze Veitch Memorial Medal and £2 10s.

To Mr. R. Jones, The Gardens, Clova Harlow Oval, Harrogate, for Begonias.

THE FOREMARKE CHALLENGE CUP COMPETITION.

AUGUST 14, 1928.

The Foremarke Challenge Cup, for twenty spikes of named Gladioli in not less than ten varieties, was awarded to Mr. W. E. Phillips, 52 Clarence Road, Wood Green.

A lecture was given by Mrs. W. J. Muller on "Herbaceous Borders." (see p. 379), Mr. W. A. Bilney, J.P., V.M.H., being in the Chair.

R.H.S. FRUIT COMPETITIONS FOR AMATEURS.

AUGUST 28, 1928.

Chief Awards.

Class 1.—Collection of Peaches and Nectarines.

First Prize, Silver Bunyard Medal and £5.
To Lord Swaythling (gr. Mr. F. J. Rose), Bitterne, Southampton.

Second Prize, Bronze Bunyard Medal and £2 10s.
To E. G. Hunt, Esq., Muddlebridge House, Fremington, Barnstaple.

Class 17.—Collection of Apples.

First Prize, Silver Bunyard Medal and £4.
To J. A. Stidston, Esq., Bishopsteignton, Teignmouth, Devon.

Second Prize, Bronze Bunyard Medal and £2.
To C. G. A. Nix, Esq. (gr. Mr. E. Neal), Tilgate, Crawley, Sussex.

Class 25.—Collection of twelve dishes of fruits.

First Prize, Silver Hogg Medal and £6.
To Lord Swaythling.

Second Prize, Hogg Medal and £3.
To C. G. A. Nix, Esq.

THE AUTUMN SHOW.

SEPTEMBER 27–28, 1928.

The following assisted the Council to make awards :—

- BAKER, W. G.
- BEAN, W. J., I.S.O., V.M.H.
- BEDFORD, A.
- BILNEY, W. A., J.P., V.M.H.
- CHURCHER, Major GEORGE.
- COBB, A. J.
- COLMAN, Sir JEREMIAH, Bt., V.M.H.
- CORY, R., F.L.S.
- COUTTS, J.
- CRANE, D. B.
- CURTIS, C. H., F.L.S.
- DARLINGTON, H. R., M.A., F.L.S.
- FINDLAY, R.
- GIBBS, Hon. VICARY, V.M.H.
- HANBURY, F. J., F.L.S., V.M.H.
- HARROW, G.
- LAWRENCE, Sir WILLIAM, Bt.
- McLEOD, J. F.
- MAY, H. B., V.M.H.
- METCALFE, A. W.
- PEARSON, C. E., F.L.S., V.M.H.
- PRESTON, F. G.
- SHILL, J. E.
- TAYLOR, T. W.
- WILDING, E. H.
- WILLIAMS, Dr. A. H.

Awards.

Wigan Cup, for the best exhibit of Roses.

To Messrs. McGredy, Portadown.

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.
To Messrs. McGredy, for Roses.

Silver Cup.

To Messrs. Stuart, Low, for Orchids.
To Mr. T. M. Endean, for Cacti and Mesembryanthemums.
To Mr. J. W. Forsyth, for Chrysanthemums.
To Messrs. Hillier, for trees, shrubs, and conifers.
To Messrs. Russell, for stove and greenhouse plants.
To Messrs. Dickson & Robinson, for Dahlias.
To Messrs. Dobbie, Ltd., for Dahlias.
To Mr. W. E Chaplin, for Roses.
To Messrs. Alex. Dickson, for Roses.
To Mr. T. Robinson, for Roses.

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for Orchids.
To Messrs. Sanders, St. Albans, for Orchids.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. Sutton, Reading, for Gloxinias.
To Messrs. Ingwerson, Sharpthorne, E. Grinstead, for rock-garden plants, dwarf shrubs, and dwarf conifers.
To Messrs. Bath, Wisbech, for Gladioli.
To Mr. Notcutt, Woodbridge, for shrubs.
To Mr. Reuthe, Keston, for shrubs.
To Messrs. Waterer, Sons & Crisp, Bagshot, for trees and shrubs.
To Messrs. Jarman, for Dahlias.
To Mr. Woolman, for Dahlias.
To Messrs. Fairbairn, for Phloxes.
To Messrs. Ladhams, for Lobelias and hardy flowers.
To Messrs. Perry, for mixed group of herbaceous and bulbous plants.
To Messrs. M. Prichard & Sons, for herbaceous plants.
To Messrs. Wallace, Tunbridge Wells, for mixed group of shrubs, bulbous and herbaceous plants.
To Messrs. Waterer, Sons & Crisp, Twyford, for herbaceous plants.
To Messrs. Oliver & Hunter, for group of Montbretias, Gentians, &c.
To Messrs. Perry, for group of herbaceous and aquatic plants.
To Messrs. Elisha J. Hicks, for Roses.
To Messrs. Wheatcroft Bros., for Roses.

Silver-gilt Banksian Medal.

To Messrs. Black & Flory, for Orchids.
To Messrs. Cowan, for Orchids.
To Messrs. Allwood Bros., for Carnations.
To A. P. Brandt, Esq. (gr. Mr. J. W. Barks), for stove and greenhouse plants.
To Messrs. Stuart Low, for Carnations.
To Messrs. Clarence Elliott, for rock-garden plants.
To Messrs. Maxwell & Beale, for alpines.
To Mr. Ernest Ballard, for Michaelmas Daisies.
To Messrs. Luxford, for Chrysanthemums.
To Messrs. Cheal, for shrubs.
To Messrs. Russell, for Clematis and other climbing plants.
To Messrs. Jones, for Dahlias.
To Messrs. Treseder, for Dahlias.
To Mr. J. T. West, for Dahlias.
To Mr. J. B. Riding, for Dahlias.
To Lady Aberconway and Hon. H. D. McLaren, for Nerines.
To Messrs. Bakers, for hardy plants.
To Messrs. Bunyard, for herbaceous plants.
To Messrs. Carter, for flowering plants.
To Mr. A. Gavin Jones, for herbaceous plants.
To Mr. W. Wells, Junr., for Michaelmas Daisies and other herbaceous plants.
To Messrs. Hewitt, for mixed group of Delphiniums and Asters.
To Messrs. Rogers, for mixed group of dwarf shrubs, rock garden and herbaceous plants.
To Mr. T. Smith, for group of shrubs, and herbaceous plants.
To Messrs. Allen, for Roses.
To Mr. John Mattock, for Roses.
To Mr. J. H. Pemberton, for Roses.
To Messrs. T. Smith, for Roses.
To Messrs. Waterer, Sons & Crisp, for Roses.
To Messrs. Frank Cant, for Roses.

Silver Flora Medal.

To the Backhouse Nurseries, Ltd., for rock-garden plants.
To Messrs. Casburn & Welch, for alpines.
To Messrs. Gibson, for dwarf shrubs and alpines.
To Messrs. M. Prichard, for rock-garden plants.
To Mr. Wm. Yandell, for Chrysanthemums.
To the Donard Nursery Co., for trees and shrubs.
To Messrs. Carter Page, for Dahlias.
To the King's Acre Nurseries, for Dahlias.
To Messrs. House, for group of Kniphofias, Scabious, and Montbretias.
To Messrs. Kelway, for group of Gladioli and herbaceous plants.
To Messrs. Easlea, for Roses.
To Messrs. Prior, for Roses.
To Messrs. Morse, for Roses.

Silver Banksian Medal.

To Mr. S. Smith, for Cacti and succulents.
To Mr. G. G. Whitelegg, for rock-garden plants.
To Mr. T. Bones, for Michaelmas Daisies.
To Messrs. Jones, for Michaelmas Daisies.
To Messrs. Jackman, for Clematis.
To Messrs. Stredwick, for Dahlias.
To Messrs. Langridge, for Dahlias.
To the Chalk Hill Nurseries, for hardy plants.
To Messrs. Cutbush, for mixed group of Dahlias and Michaelmas Daisies.
To Messrs. Wood, for hardy plants.
To Messrs. Barr, for group of Michaelmas Daisies and herbaceous plants.
To Messrs. MacDonald, for lawn garden.
To Mr. R. V. Roger, for Roses.
To Messrs. Warner, for Roses.
To Messrs. Wood & Ingram, for Roses.

Flora Medal.

To Messrs. Peed, for stove and greenhouse plants.
To Mr. P. Gardner, for rock-garden plants.
To Mr. W. J. Marchant, for trees and shrubs.
To Messrs. Hewitt, for Dahlias.
To Messrs. Forbes, for Phloxes, Pentstemons, etc.
To Messrs. Charles Turner, for mixed group of Dahlias and shrubs.
To Messrs. Cutbush, for Kniphofias.
To Messrs. Daniels Bros., for Montbretias and Gaillardias.
To Messrs. Harkness, for hardy flowers.
To Mr. H. Hemsley, for mixed group of herbaceous and rock-garden plants.
To Messrs. Ben Cant, for Roses.
To Dowty's Rosery, for Roses.
To Messrs. Laxton Bros., for Roses.
To Mr. D. Long, for Roses.

Banksian Medal.

To Messrs. Allwood Bros., for hybrid Pinks.
To Messrs. Charlton, for trees and shrubs.
To Messrs. Bowell & Skarratt, for herbaceous plants.
To Mr. G. Reuthe, for group of hardy plants.
To the Central Garden Supplies, for group of herbaceous plants, alpines, and shrubs.
To Messrs. Redgrove, for herbaceous plants.
To Mr. F. Rich, for mixed group of Michaelmas Daisies.
To Messrs. Rich & Cooling, for Michaelmas Daisies, herbaceous plants, and Dahlias.
To Messrs. Simpson, for group of Asters, Antirrhinums, and Montbretias.
To Mr. G. E. P. Wood, for alpine and herbaceous plants.
To Mr. H. Clarke, for group of Dahlias and Larkspurs.

FRUIT AND VEGETABLE SHOW.

October 9, 1928.

Judges.

Allgrove, J. C.
Barker, S.
Barnes, N. F.
Beckett, E., V.M.H.
Bullock, A.
Bunyard, E. A., F.L.S.
Chapman, H.
Cheal, J., V.M.H.
Cook, C. H.
Cook, T. H.
Cuthbertson, D.
Earl, W. J.
Gibson, J.
Goodacre, J. P.
Janes, E. R.
Jeary, T. J.
Jordan, F.
Laxton, E.
Markham, H.
Metcalfe, A. W.
Neal, E.
Pearson, A. H., J.P., V.M.H.
Prince, H. A.
Rivers, H. S.
Rochford, J. P., J.P.
Smith, A. C.
Taylor, H. V.
Turnbull, J.
Veitch, P. C. M., J.P., V.M.H.
Waight, B. C.
Wakely, C.
Weston, J. G.
Wilkin, H. T.
Wilson, J.
Woodward, G.

Chief Awards.

Fruit.

The Gordon-Lennox Cup, for the most meritorious display of fruit staged by an Amateur.

To Capt. Maldwin Drummond (gr. Mr. L. L. A. Smith), Cadland Park, Southampton.

The George Monro Memorial Cup, for the best exhibit of Grapes staged by an Amateur.

To Lady Durning Lawrence (gr. Mr. J. Rutherford), King's Ride, Ascot.

Class 1.—Amateurs. Collection of nine dishes of ripe dessert fruit.
First Prize, Silver Hogg Medal and £9.
To Baron Bruno Schröder (gr. Mr. E. J. Henderson), Englefield Green.

Class 2.—Amateurs. Collection of six dishes of ripe dessert fruit.
First Prize, Silver Hogg Medal and £6.
To Lord Swaythling (gr. Mr. F. J. Rose), Bitterne, Southampton.

Class 3.—Amateurs. Collection of eight bunches of Grapes.
First Prize, Silver Hogg Medal and £15.
To Lord Swaythling.

Class 4.—Amateurs. Collection of four bunches of Grapes.
First Prize, Silver Hogg Medal and £6.
To Lady Durning Lawrence.

Class 13.—Amateurs. Collection of thirty dishes of hardy fruits.
First Prize, Silver Hogg Medal and £15.
To Capt. Maldwin Drummond.

Class 14.—Amateurs. Collection of twelve dishes of hardy fruits.
First Prize, Silver Hogg Medal and £6.
To Sir Randolph Baker (gr. Mr. A. E. Usher), Ranston, Blandford.

Class 19.—Amateurs. Collection of eighteen dishes of dessert Pears.
First Prize, Silver-gilt Hogg Medal and £10.
To Capt. Maldwin Drummond.

Class 117.—Market Growers. Four British standard boxes of Cox's Orange Pippin.
First Prize, Silver Hogg Medal and £5.
To Reading University, Reading.

Class 118.—Market Growers. Four British standard boxes of dessert Apples.
First Prize, Silver Hogg Medal and £5.
To Reading University, Reading.

Class 120.—Market Growers. Four British standard boxes of cooking Apples.
First Prize, Silver Hogg Medal and £5.
To Reading University, Reading.

Class 121.—Market Growers. Three boxes of Cox's Orange Pippin.
First Prize, Bronze Hogg Medal and £3.
To Mr. G. Burnett-Stuart, Manor Farm, Danbury.

Class 122.—Market Growers. Three boxes of dessert Apples.
First Prize, Bronze Hogg Medal and £3.
To Reading University, Reading.

Class 123.—Market Growers. Three boxes of Conference Pears.
First Prize, Bronze Hogg Medal and £3.
To Messrs. F. & T. Neame, Faversham.

Class 124.—Market Growers. Three boxes of Doyenné du Comice Pears.
First Prize, Bronze Hogg Medal and £3.
To Messrs. F. & T. Neame, Faversham.

The Affiliated Societies Challenge Cup, which was offered for award for the best exhibit of fruit staged by an Affiliated Society, was awarded to the Romsey and District Gardeners' Association.

Vegetables.

The R.H.S. Challenge Cup, for the highest aggregate number of points.
To Lord Riddell (gr. Mr. A. Payne), Walton Heath Golf Club.

The Sutton Cup, for a collection of vegetables.
To Viscount Hambledon (gr. Mr. W. Turnham), Henley-on-Thames.

Class 2.—Collection of nine kinds of vegetables.
To Lord Riddell.

A lecture was given by Mr. R. G. Hatton, M.A., on "Some Aspects on the Problem of Stocks for Fruit Trees."

IMPERIAL FRUIT SHOW.

OCTOBER 19–27, 1928.

Awards made at the Imperial Fruit Show, held at Belle Vue Gardens, Manchester.

Gold Medal.

To Messrs. W. Seabrook & Sons, Ltd., Chelmsford, for four boxes of Cox's Orange Pippin.

To Messrs. W. Seabrook & Sons, Ltd., Chelmsford, for four boxes of Worcester Pearmain.

LECTURE.

NOVEMBER 13, 1928.

A lecture was given by Mr. M. B. Crane, on "The Pollination of Fruit Trees."

SCIENTIFIC COMMITTEE.

JULY 8, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and seven other members present.

Cremanthodium Delavayi.—It was reported that the Cremanthodium shown at the last meeting (see p. xxxv) was *C. Delavayi.*

Curiously marked wood.—Mr. Fraser showed a very curiously marked section of a Sycamore where the "heart wood" took the form of a leaf of maple, but in which the annual rings showed no interruption, so that part only of some of them was coloured. No explanation of the form taken by the discoloration was forthcoming.

Gall on Brassica Sinapis.—Mr. Fraser showed a specimen of Charlock with one flower very greatly hypertrophied, following the attack of a fungus upon it.

Cereus hybrid.—Mr. Worsley showed a flower of a hybrid *Cereus* × *Coopermannii* (*Cooperi* × *Ackermannii* × *amaecamensis*) in which the flower was of an unusual shade of orange-red.

Reversion in Moss-Rose.—Mr. Van der Weyer showed a flower from a moss-rose in which the petals were devoid of the mossy cresting which is typical of moss-roses—showing a reversion to the original form.

Vallota hybrid.—Mr. Scrase Dickins showed flowers of a Vallota hybrid (of which the history is to come) having a white eye and a pink stripe between the segments.

SCIENTIFIC COMMITTEE, JULY 31, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and seven other members present.

Sweet William spirally twisted.—Mr. Fraser showed a curiously twisted stem of Sweet William with a marked spiral contortion. An insect had been feeding in the somewhat swollen stem, but there was nothing to connect this with the spiral contortion.

Leucocoryne ixioides.—Mr. Worsley showed flowers of *Leucocoryne ixioides,* a plant rarely seen in English gardens.

Antirrhinum unbranched.—Mr. Hales showed on behalf of Mr. Wood of Hayes an unbranched *Antirrhinum majus.* There were no axillary buds in the lower leaf axils, and though normal bracts had developed in the upper part of the stem, there were no flowers. Some of the bracts were coloured at the distal ends.

SCIENTIFIC COMMITTEE, AUGUST 14, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and seven other members present.

Salvias.—Mr. J. Fraser showed a series of dried specimens of British Salvias, and pointed out that the plant hitherto known as *Salvia verbenaca* is now regarded as *S. horminoides. S. pratensis* occurs on Salisbury Plain and near Bury St. Edmunds.

Rust in Antirrhinums.—Mr. Cuthbertson drew attention to the great destruction wrought by *Puccinia Antirrhini* on Antirrhinums in California and elsewhere in America. This rust has apparently not yet reached England, but appears to spread rapidly when once introduced to a district.

Bees visiting extra floral nectaries.—Mr. Marsden-Jones reported that he had seen bees this year visiting the nectaries on the leaves of the Cherry Laurel.

SCIENTIFIC COMMITTEE, AUGUST 28, 1928.

Sir DAVID PRAIN, F.R.S., in the Chair, and six other members present.

Actinidia coriacea.—Mr. Armitage Moore sent shoots of this uncommon Chinese plant from his garden in Ireland.

Fasciated Dahlias.—Messrs. Langridge of Westerham sent examples of Dahlia Duke of Fife with fasciated flower-heads so developed as to be back to back, and form what appeared to be a two-faced flower. Several examples were sent.

Flowering of Cherries and Plums.—Mr. Hooper of Wye sent particulars of his observations on the flowering period of cherries and plums in Kent. The latter overlap to a large extent, but the varieties seem to be divisible into three groups, early, mid, and late-flowering, and planting should be carried out accordingly so as to ensure effective cross-pollination.

Nitrate poisoning.—Mr. Worsley drew attention to instances of alleged poisoning of soil by continuous manuring with nitrates.

Daucus red flowered.—Mr. Fraser showed dried specimens of wild carrot to draw attention to the crimson " eye " and its possible origin. He found in the two species which occur wild in Great Britain reddish flowers through the head much more frequently in *Daucus Carota* than in *D. gummifer.*

Delphinium hybrids.—Mr. Blaythwayt of Porlock sent plants of a cross between *D. macrocentron* and *D.* × ' Marian Cran,' the latter being the seed parent. The plants were tall and showed little of the influence of *D. macrocentron* unless it be for a large dark centre in the white-flowered plant. The other was blue with a dark centre of about normal dimensions.

SCIENTIFIC COMMITTEE, SEPTEMBER 11, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and seven other members present.

Pear with foliaceous sepals.—Mr. Fraser showed a late developed Pear with foliaceous sepals. The axis within this developed four small pears, one of which had a leaf scar on its side, with a bud in the axil.

Polyantha rose aberrant.—He also showed a dwarf Polyantha rose which refused to flower, but produced sepal-like leaves with tiny flowers in their axils, having four or five sepals.

Solanum Fontainesianum.—Mr. Fraser also showed this species from a garden in Sussex where it had appeared as a weed.

Brunsdonna × *Parkeri alba.*—Mr. Worsley showing this white-flowered hybrid remarked that although Herbert is said to have made the cross between Brunsvigia and Amaryllis Belladonna no records exist of his seedlings having flowered. *Amaryllis blanda* was also shown.

Mahoberberis × *Neubertii.*—Mr. Hosking showed a trimorphic shoot of this hybrid between *Mahonia Aquifolium* and *Berberis vulgaris.* The shoot had foliage similar to that of its two parents and also the holly-like leaves normal to the hybrid. He also showed for comparison of leaf spines *Berberis Hookeri, B. acuminata, B. Knightii, B. Lycium, B. Guimpelii, B. dictyophylla,* and *B. verruculosa.*

SCIENTIFIC COMMITTEE, OCTOBER 9, 1928.

Sir DAVID PRAIN, F.R.S., in the Chair, seven other members and Lady BEATRIX STANLEY present.

Crocus karduchorum.—Lady Beatrix Stanley showed *Crocus karduchorum,* a native of Kurdistan, which had reached her garden as a single corm among *C. zonatus.* It is very rare in cultivation. Mr. Bowles remarked upon the curious way in which its new corms are developed from the buds at the base of the old corm, so that the new terminal buds are pointing either down or nearly so, and the new growths have accordingly to curve to reach the light.

White fly parasite.—Mr. Preston showed leaves of *Boehmeria nivea tenacissima* with larvæ of white fly which had been attacked by a chalcid parasite. This had appeared at various places including Wisley and the Cheshunt Experimental Station whence it had been distributed.

Purple-podded Pea.—Dr. Voelcker showed a purple-podded variety of the culinary pea, which had been in cultivation for a long period.

Gymnocladus canadensis.—Mr. Fraser showed flowers of the Kentucky Coffee tree, *Gymnocladus canadensis*, which had flowered this summer in a garden in Kew village; and drew attention to its small size in comparison with the large seed which it produced.

SCIENTIFIC COMMITTEE, OCTOBER 30, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and nine other members present.

Correlation in colour of flower and seed.—Mr. Worsley remarked on the correlation between the colour of flower and seed in many varieties of runner beans and exhibited a series of seeds in illustration of it.

Festuca ovina.—Mr. J. Fraser showed a series of dried specimens of *Festuca ovina* to illustrate some remarks upon the nomenclature of *F. ovina capillata* (= *tenuifolia*). Of this variety some plants have long flowering stems and short leaves, but others (he thought merely due to differences in position) long stems and leaves. The typical form of *F. ovina* has glumes shortly awned and in the variety *hispidula* these awns are rough. The last he had found near Slough.

Flowering of Pears.—Mr. Hooper showed a table in illustration of his observations carried out this year at Maidstone on the order of flowering of pears. This order, allowing for variations due to season and age of trees, agreed closely with published results (see JOURNAL R.H.S., **39**, p. 366).

Lycium sp.—Mr. Loder drew attention to a species of Lycium exhibited at to-day's Show which appeared to be *L. halimifolium*.

SCIENTIFIC COMMITTEE, NOVEMBER 13, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and ten other members present.

Flowering period of Apples.—Mr. C. H. Hooper brought a chart showing the flowering season of about a hundred varieties of apples. He remarked that it showed the earlier varieties do not overlap the later varieties such as 'Crawley Beauty' in flowering, and it is thus important that the flowering period should be studied when planting schemes are being arranged. The order, with minor differences, followed that already published in the Society's Journal.

Ranunculus calandrinioides.—This plant sent up from the Floral Committee was before this Committee with a suggestion for a Botanical Certificate, which was not, however, taken up. It was shown by Sir William Lawrence and is a native of Morocco.

Varieties of Pyrus Aria.—Mr. Fraser showed some dried specimens of *Pyrus Aria* forms and made some remarks upon the identity of *Pyrus Aria majestica*.

SCIENTIFIC COMMITTEE, NOVEMBER 27, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and ten other members present.

Loliums wild in Britain.—Mr. Fraser showed a number of dried specimens of Loliums from various localities in Britain and pointed out the differences between them. They included *Lolium perenne, L. tenue, L. aristatum forma, L. cristatum, L. italicum,* and *L. temulentum.* He remarked that some of these forms are highly regarded by graziers, *L. italicum* (*L. multiflorum*) particularly. Prof. Armstrong drew attention to the experiments in grazing lately carried out, and remarked that little regard appeared to be paid by beasts to species: so long as the herbage was young they would eat it and with profit.

Cold Storage of Fruit.—Mr. Hooper showed a pear which had been in cold storage and remarked upon the success which had attended Mr. Neame's storage of fruit, suggesting that a lecture on that subject from him would be a useful thing.

Double Cypripedium.—Mr. F. J. Hanbury showed a flower of Cypripedium in which parts had been doubled or trebled. Others on the same plant were normal. The flower was referred to Mr. Worsdell.

Cyclamen attacked by Otiorrhynchus.—Mr. Wood of Hayes sent a plant of *Cyclamen latifolium* which had some of the roots eaten away. The soil contained grubs of the weevil Otiorrhynchus which is the cause of the damage.

SCIENTIFIC COMMITTEE, DECEMBER 11, 1928.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., V.M.H., in the Chair, and seven other members present.

Festuca rigida.—Mr. Fraser showed *Festuca rigida* in its erect and procumbent forms and *F. rottboellioides* from S. Devon.

Chilean Pea.—Dr. Voelcker showed examples of seed of a Leguminous plant which was referred to as a Chilean pea, which had proved poisonous to stock. No member could identify it, however, from the seed alone.

Tulipa kuschkensis.—Mr. Chittenden showed a bulb of *Tulipa kuschkensis* as received from Turkestan through Mr. Prins of Haarlem, to illustrate the great thickness attained by the woolly scales of Tulips of this section in their native habitat.

FRUIT AND VEGETABLE COMMITTEE.

JULY 3, 1928.

Mr. J. CHEAL in the Chair, and six other members present.

Awards Recommended :—

Silver-gilt Hogg Medal.

To Messrs. Laxton, Bedford, for Strawberries.

Silver Knightian Medal.

To Messrs. Barr, Covent Garden, for vegetables.

FRUIT AND VEGETABLE COMMITTEE, JULY 17, 1928.

Mr. W. POUPART, V.M.H., in the Chair, and thirteen other members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Laxton, Bedford : Black Currant ' Blacksmith.'
Mr. A. Farmer, Romsey : seedling Gooseberry.
Mr. J. J. Kettle, Wimborne : Raspberry ' Lord Lambourne.'
Messrs. Hemsley, Crawley : Berries.

FRUIT AND VEGETABLE COMMITTEE, JULY 31, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and ten other members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Bunyard, Maidstone : Gooseberries.
Messrs. Stark, Fakenham : Tomato ' Table Dainty.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 14, 1928.

Mr. J. CHEAL, V.M.H., in the Chair, and eight other members present.

It was recommended that the Pear ' Early Market,' exhibited by Messrs. Laxton, Bedford, should be included in the Commercial Fruit Trials at Wisley.

Other Exhibits.

Messrs. Spooner, Hounslow : collection of Apples.
E. A. Bunyard, Esq., Maidstone : Apple ' White Astrakan.'

The recommendations made by the sub-committee visiting Wisley to judge the trials of Capsicums and Aubergines were confirmed.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 28, 1928.

Mr. A. H. PEARSON, V.M.H., in the Chair, and eighteen other members present.

No awards were recommended on this occasion.

The Apple ' Epicure ' exhibited by Messrs. Laxton, Bedford, was recommended as the most promising seedling Apple which has not previously been exhibited at any of the Society's Meetings. If this recommendation is confirmed in 1929 the Apple will be awarded the Bunyard Cup.

Other Exhibits.

Dr. J. Walker, Ham: Apple 'Camelot.'
Mr. G. C. Drabble, Sandown: seedling Blackberry.
Messrs. Laxton, Bedford: Apple 'Leader,' and the 'Veitchberry.'
Messrs. Brooks, Weston-super-Mare: Apple 'Beely Pippin.'
Mr. H. Prince, Reading: *Physalis edulis*.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 11, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and ten other members present.

Awards Recommended:—

Silver Hogg Medal.

To Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.

Hogg Medal.

To Messrs. Spooner, Hounslow, for Apples.

Other Exhibits.

Mr. J. L. Holbrook, Chingford: Apple 'Ethel Rawlings.'
Sir T. Lipton, Bt., Southgate: Melon 'Sir Thomas Lipton.'

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 26, 1928.

AUTUMN SHOW.

Mr. A. H. PEARSON, V.M.H., in the Chair, and fourteen other members present.

No awards were recommended on this occasion.

The seedling Blackberry (*Rubus rusticanus inermis* × *R. thyrsiger*) exhibited by the John Innes Horticultural Institute, Merton, was recommended for inclusion in the Commercial Fruit Trials at Wisley.

Other Exhibits.

Mr. G. Matthews, Chertsey: seedling Plum.
Mr. G. Wratten, Bembridge: seedling Apple.
Messrs. Ballington, Matlock: Apple 'Ballington's Beauty.'
Mr. A. Wright, N. Walsham: seedling Apples.
Mr. T. E. Ryder, Newnham: Apple 'Eltonian.'
Mr. H. Patience, Worcester: Apple 'Beely Pippin.'
Mr. H. J. Cutler, Winlow, Canada: Apple 'Golden Sunset.'
Mr. C. Smallwood, Congleton: Apple 'Smallwood's Seedling.'
Mr. C. Orchard, Bembridge: Apple 'Cornelius Orchard'
Mr. W. H. Divers, V.M.H., Hook: seedling Apple 'John Divers.'
Mr. T. McPhail, Devon: seedling Apples.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 9, 1928.

Mr. A. H. PEARSON, V.M.H., in the Chair, and twenty-two other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Potatos.
To Hon. Vicary Gibbs, Aldenham, for vegetables.
To Messrs. Sutton, Reading, for vegetables.

Silver-gilt Hogg Medal.

To University of Reading, Reading, for Apples.
To Messrs. Cheal, Crawley, for collection of fruit.
To C. G. A. Nix, V.M.H., Esq., Crawley, for collection of fruit.
To Messrs. Bunyard, Maidstone, for collection of fruit.
To Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.
To Messrs. J. C. Allgrove, Slough, for collection of fruit.
To Barnham Nurseries, Ltd., Barnham, for Apples and Pears.
To Messrs. Laxton, Bedford, for collection of fruit.

Silver Hogg Medal.

To Messrs. Notcutt, Woodbridge, for collection of fruit.
To Messrs. Waterer, Son & Crisp, Bagshot, for collection of fruit.
To Messrs. Spooner, Hounslow, for Apples.
To Swanley Horticultural College, for collection of fruit.

Hogg Medal.

To Mr. Brain, Cardiff, for Apples.
To Mr. W. J. H. Whittall, Haslemere, for Apples.

Award of Merit.

To Apple ' King George V ' (votes unanimous), from Messrs. J. Cheal, Crawley. This new apple was raised by Lady Thornycroft, Bembridge, from seed of ' Cox's Orange Pippin.' The fruit is of medium size, round and flattened at eye and base. It is almost wholly covered with bright red, on a rich yellow base, with streaks of darker red and crimson on the sides. The flesh is crisp and firm and of very good flavour, approaching the richness of ' Cox's Orange Pippin.' The eye is partly closed in a broad and shallow basin ; the stalk of medium length in a deep and narrow cavity. The apple is in season in February, March and April. The sub-committee which inspected trees growing in the [illegible] reported the trees cropping heavily and growing well.

Other Exhibits.

Mr. J. J. Kettle, Wimborne : Raspberries.
Messrs. Daniels, Norwich : Apples and Pears.
Mr. J. Harris, Carey : Apple ' Crimson Cox.'
Mr. H. Chapman, Rye : Apple ' Saltcote Pippin.'
Mr. G. Heath, Henley : seedling Apple.
Hon. Maude Russel, Leicester : Apple ' Russel's Seedling.'
Mr. W. Ingall, Grimoldby : Apple ' Ingall's Red.'
Mr. A. E. Cunningham, Gulval : seedling Apple.
Mr. F. Stonor, Parkgate : Tomatos.
Mr. P. Finch, Wolverhampton : seedling Apple.
Mrs. M. C. Lester, Horsted Keynes : Raspberry.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 30, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and fourteen other members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Sutton, Reading : Cabbages.
Messrs. Bunyard, Maidstone : Apples.
Mr. F. Groom, Belvedere : seedling Apple.
Mr. H. B. W. Smith, Gainsborough : Apple for opinion.
Hon. Mrs. Wilmot, Worcester : seedling Apple.
Mr. W. H. Divers, V.M.H., Hook : Apple ' John Divers.'
Mr. F. Streeter, Petworth Park : Apples for opinion.
Mr. G. Wratten, Bembridge : seedling Apple.
Mr. J. J. Kettle, Wimborne : Raspberries.

The recommendations made by the sub-committee visiting Wisley to judge the trial of Carrots were confirmed.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 13, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and twelve other members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Barr, Covent Garden, for vegetables.

Other Exhibits.

Mr. R. J. Corbett, Merioneth : Apple ' Madresfield Court.'
Rev. T. Poole, Culmstock : Apple ' Culmstock.'
Mr. W. H. Hornsey, Buckden : seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 27, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Hogg Medal.

To Hon. Vicary Gibbs, Aldenham, for collection of Grapes.

Other Exhibits.

Miss Sewell, London, S.W. 10 : Preserves.
Mr. F. Farrer, Bedford : seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 11, 1928.

Mr. C. G. A. NIX, V.M.H., in the Chair, and twelve other members present.

Awards Recommended :—

Silver Hogg Medal.

To Lady Juliet Duff, Kingston Hill, for Apples and Pears.

Other Exhibits.

Mrs. Wintour, Loose : Preserves.
Mr. F. Streeter, Petworth Park : Brussels Sprouts ' Filbert.'
Mr. V. Gammon, Witney : seedling Apple.
Miss Sewell, London, S.W. 10 : Preserves.
Mrs. Fleming, Uxbridge : Preserves.

FLORAL COMMITTEE.

JULY 3, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums
To Mr. H. J. Jones, Lewisham, for Delphiniums.
To J. A. de Rothschild, Esq., Aylesbury, for Anthuriums.

Silver-gilt Banksian Medal.

To Messrs. Dickson, Newtownards, for Roses.

Silver Banksian Medal.

To Messrs. Barr, Taplow, for Irises.
To Mr. T. Bones, Cheshunt, for Delphiniums.
To Messrs. B. Cant, Colchester, for Roses.
To Messrs. Chaplin, Waltham Cross, for Roses.
To Messrs. Hewitt, Solihull, for Delphiniums.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. G. Lilley, Slough, for Roses.
To Messrs. McGredy, Portadown, for Roses.
To Messrs. Russell, Richmond, for stove plants.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Bath, Wisbech, for Delphiniums and Pæonies.
To Messrs. F. Cant, Colchester, for Roses.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. S. J. Goodliffe, Bishop's Stortford, for Delphiniums.
To Mr. E. B. le Grice, North Walsham, for Roses.
To Messrs. Harkness, Leeming Bar, for Lupins.
To Mr. G. W. Miller, Wisbech, for herbaceous plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Mr. H. Prins, Wisbech, for Irises, etc.
To Messrs. Sutton, Reading, for Godetias.
To Messrs. Warner, Colchester, for Roses.
To Mr. F. G. Wood, Ashtead, for herbaceous plants.

Award of Merit.

To *Anthurium Andreanum* 'Mrs. James de Rothschild' as a stove pot plant (votes unanimous), from J. A. de Rothschild, Esq. (gr. Mr. G. F. Johnson), Waddesdon. This variety resulted from a cross between *A. Andreanum* and an unnamed pink seedling. It has a large pale salmon spathe and a deep cream spadix.

To *Anthurium Andreanum versaillense* as a stove pot plant (votes 6 for, 1 against), from J. A. de Rothschild, Esq. A variety of French origin and unknown parentage. It has a large white spathe and a pale pink spadix tipped with orange.

To *Anthurium Andreanum waddesdonensis* as a stove pot plant (votes unanimous), from J. A. de Rothschild, Esq. This variety is the result of a cross between A. 'Perfection' and *A. sanguineum.* It has a large rosy-scarlet spathe and a pale orange spadix.

To *Anthurium Andreanum* 'Yvonne Johnson' as a stove pot plant (votes unanimous), from J. A. de Rothschild, Esq. This variety is the result of a cross between *A. Andreanum* and A. 'Monsieur Hardy.' The spathe is large and of a deep salmon colour, while the spadix is cream.

To Rose 'Chaplin's Pink Climber' for cutting (votes unanimous), from Messrs. Chaplin, Waltham Cross. A very free-flowering large double cerise-pink climbing

Rose. It is the result of a cross between ' American Pillar ' and ' Paul's Scarlet Climber.'

To Rose ' Cherry ' for cutting (votes 14 for), from Messrs. McGredy, Portadown. A very pretty cherry-red Hybrid Tea variety with an apricot reverse.

To Rose ' Lucie Marie ' for cutting (votes unanimous), from Messrs. Dickson, Newtownards. A pale apricot-coloured Hybrid Tea variety of excellent shape.

To Rose ' Portadown ' for cutting (votes unanimous), from Messrs. McGredy, Portadown. A crimson Hybrid Tea variety of good shape.

To Rose ' Swansdown ' for market and cutting (votes unanimous), from Messrs. Dickson, Newtownards. An excellent white Hybrid Tea variety.

Selected for trial at Wisley.

Delphinium ' Mrs. Sydney Pearson ' from S. Pearson, Esq., Seabrook.
Godetia ' Double Cherry Red ' from Messrs. Sutton, Reading.

Other Exhibits.

Mr. C. Allaway, Goring : Delphinium ' Mary Warden.'
Messrs. Allwood, Haywards Heath : Dianthus ' Sweet Wivelsfield.'
Mr. Archer and Daughter, Sellinge : Roses.
Mr. N. Baggesen, Pembury : herbaceous plants.
Messrs. Bunyard, Maidstone : old-fashioned Roses.
Mr. T. Carlile, Twyford : Delphiniums.
Messrs. Dutton, Iver : Carnations.
Lady Hadden, Berkhamsted : Delphinium ' Lady Goodwin.'
Mrs. Carl Holmes, Welwyn : *Anthurium Scherzerianum* ' The Node ' variety.
C. J. Howlett, Esq., Earley : Fuchsia.
Messrs. Ladhams, Southampton : Sidalcea ' Shirley Rose.'
A. J. Morten, Esq., Hartpury : Rose ' Rosebud.'
Mrs. M. Stewart, Richmond : *Viola cornuta* ' Sir Jack ' and ' Sun Lover.'
The Foster-Melliar Gardens, Flexbury : Alstroemerias.
A. Worsley, Esq., Isleworth : Cactus ' Orange.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and sixteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other bulbous plants.
To Messrs. Prichard, Christchurch, for alpine plants.

Banksian Medal.

To Mr. J. Robinson, New Eltham, for alpine and herbaceous plants.
To Messrs. Tucker, Oxford, for alpine and herbaceous plants.

Award of Merit.

To *Alstroemeria Ligtu* var. *angustifolia* as a hardy flowering plant (votes unanimous), from Lt.-Col. L. C. R. Messel, Handcross. A very beautiful pale pink Alstroemeria collected by Mr. H. F. Comber (no. 736) in the Argentine. A sandy soil in full sun is recommended.

To *Helenium Bolanderi* as a hardy flowering plant (votes unanimous), from N. K. Gould, Esq., Ripley, Surrey. This is an early-flowering Californian species introduced fifty years ago but comparatively uncommon. The large flower-heads have bright yellow rays and a dark brown, convex disc. The height is about two feet.

To *Triptilion spinosum* as a half-hardy flowering plant (votes unanimous), from Lt.-Col. Messel. A beautiful Chilean Composite collected by Mr. H. F. Comber (no. 982). The stems are a foot high, with finely divided dark green foliage. The flower-heads are produced in terminal corymbs : the individual flowers are small and of a rich blue colour.

Other Exhibits.

Viscountess Byng of Vimy, Thorpe-le-Soken : *Pentstemon grandiflorus, P. heterophyllus.*
Central Garden Supplies, Kenton : miniature rock gardens.
Misses Hopkins, Coulsdon : rock plants.

Major Johnston, Campden: *Cyrtanthus obliquus.*
Messrs. Ladhams, Southampton: *Thalictrum giganteum.*
Messrs. Lane, Berkhamsted: *Cupressus Lanei aurea.*
Mrs. E. M. Marsden-Jones, Potterne: *Anthemis Sancti-Johannis.*
Mrs. Philip Martineau, Ascot: Escallonia 'Wellsbridge,' Rhododendron 'Master Philip.'
Mr. R. C. Notcutt, Woodbridge: *Viburnum corylifolium.*
Mr. Stephen Sims, Draycott: miniature rock gardens.

FLORAL COMMITTEE, JULY 17, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Sutton, Reading, for Sweet Peas.

Silver-gilt Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and *Dianthus Allwoodii.*
To Messrs. Bide, Farnham, for Sweet Peas.
To Messrs. Blackmore & Langdon, Bath, for Delphiniums.
To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Messrs. L. R. Russell, Richmond, for Dracaenas, etc.

Banksian Medal.

To Messrs. B. Cant, Colchester, for Roses.
To Messrs. F. Cant, Colchester, for Roses.
To Mr. S. J. Goodliffe, Bishop's Stortford, for herbaceous plants.
To Mr. H. Hemsley, Crawley, for Sidalceas.
To Mr. G. W. Miller, Wisbech, for herbaceous plants.
To Mr. A. Perry, Enfield, for Hemerocallis, etc.
To Mr. F. G. Wood, Ashtead, for herbaceous plants.

Award of Merit.

To Carnation 'Sydney Crowhurst' for cutting (votes unanimous), from Mr. J. R. Crowhurst, Burgess Hill. A hardy border variety of excellent form. The flowers are large, very fragrant, and of a bright purple colour.

To Rose 'George Daken' for cutting (votes unanimous), from The Burbage Nurseries, nr. Hinckley. A pale salmon Hybrid Tea Rose lightly flushed with deep pink. It is the result of a cross between 'Ophelia' and 'Mrs. Henry Morse.' The flowers are carried on erect stems and are very fragrant. The foliage is very attractive, being of a purplish-bronze tint.

The following plants received awards after trial at Wisley:—

Award of Merit.

To Delphinium 'Monarch of Wales' from Messrs. Hewitt, Solihull. Plant 5 feet; flower spikes 2 feet long, 6 to a plant; flowers semi-double, 1¾ to 2 inches diameter, bright azure-blue shaded deep mauve; eye white. Flowering from June 18.

To Hemerocallis 'Radiant' from G. Yeld, Esq., M.A., V.M.H., Gerrard's Cross. Foliage 3 feet tall, medium green; flower spikes branched above the middle, bearing 14 to 17 flowers; flowers 3 inches wide, funnel-shaped, bright chrome-yellow. Very free-flowering from July 2.

To Iceland Poppy 'Moonbeam' from Mrs. D. Thornely, Nursteed, Devizes. Of *nudicaule* type. Plant 15 to 18 inches tall; flowers 2½ to 3 inches diameter, opening pale cream fading to creamy-white. A good true stock.

For awards to Annual Lupins on trial at Wisley, see p. 230.

Selected for trial at Wisley.

Hemerocallis ' J. S. Gayner ' from G. Yeld, Esq., Gerrard's Cross.
Kniphofia ' Triumphans ' from Messrs. Prichard, Christchurch.
Rose ' Baby Betty ' from The Burbage Nurseries, Hinckley.

Other Exhibits.

H. J. Choul, Esq., Bridgend : seedling Border Carnation.
G. Coppen, Esq., Hayes : Delphinium ' Valda Coppen.'
H. Dan, Esq., Bournemouth : Carnation ' Carbery.'
Little Munden Nurseries, Ware : herbaceous plants.
Mr. R. C. Notcutt, Woodbridge : *Helenium croceum* var. ' Wyndley.'
Messrs. Carter Page, London : Helenium ' Wyndley.'
S. G. Wild, Esq., Dublin : *Gladiolus hybrida Wildii.*

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and twelve other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Hillier, Winchester, for shrubs.

Banksian Medal.

To Messrs. Tucker, Oxford, for alpine and herbaceous plants.
To Messrs. Waterer, Twyford, for alpine plants.

Award of Merit.

To *Cichorium Intybus roseum* as a hardy flowering plant (votes 8 for, 1 against), from Lt.-Col. the Hon. Cuthbert James, Enfield. An uncommon, pale rose-pink variety of the blue Chicory. It is a very striking plant, producing a cluster of erect stems bearing numerous flowers.

To *Monardella macrantha* as a hardy flowering plant (votes unanimous), from T. Hay, Esq., Hyde Park. An uncommon North American Bergamot. It is well suited to a warm, dry situation, where it develops numerous erect stems a foot in height, each crowned with a terminal cluster of tubular, crimson-scarlet flowers.

Other Exhibits.

Hollamby's Nurseries, Groombridge : rock garden.
Mrs. Carl Holmes, Welwyn : *Ismene festalis, I.* ' Sulphur Queen,' *Godetia sp.* (Elliott 120), *Hedychium sp.* (Farrer).
Misses Hopkins, Coulsdon : rock garden.
Messrs. Prichard, Christchurch : alpine plants.
P. Rosenheim, Esq., E. Molesey : *Campanula Morettiana.*

FLORAL COMMITTEE, JULY 31, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Phloxes.
To The Donard Nursery Co., Newcastle, Co. Down, for Dieramas.
To Mrs. H. J. Jones, Lewisham, for Phloxes.
To Messrs. Kelway, Langport, for Gladioli.
To Messrs. Sutton, Reading, for Achimenes.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Messrs. Prichard, Christchurch, for herbaceous plants.

Banksian Medal.

To Messrs. B. Cant, Colchester, for Roses.
To Messrs. F. Cant, Colchester, for Roses.
To Messrs. Dobbie, Edinburgh, for Dahlias.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. S. J. Goodliffe, Bishop's Stortford, for Phloxes, etc.
To Mr. Hemsley, Crawley, for Sidalceas.
To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.
To Mr. H. Prins, Wisbech, for Gladioli.
To Messrs. Rich & Cooling, Bath, for Phloxes.
To Messrs. Stark, Fakenham, for Sidalceas.
To Mr. B. Symons-Jeune, Old Windsor, for Phloxes.

Award of Merit.

To *Dierama pulcherrimum* 'Windhover' as a plant for garden decoration or cutting (votes unanimous), from The Donard Nursery Co., Newcastle, Co. Down. A very handsome chance seedling from selected forms raised at The Donard Nursery. The flowers are bright rose-pink and much larger and more open than those of the type.

Selected for trial at Wisley.

Phlox seedlings 'D' and 'F' from A. D. Pitcairn Campbell, Esq., Wrexham.

Other Exhibits.

G. Bullimore, Esq., Chorley Wood : Pelargonium 'Gordon Bullimore.'
Misses Hopkins, Coulsdon : herbaceous plants.
Messrs. Kelway, Langport : Gladioli and Bocconia 'Coral Plume.'
Messrs. R. Veitch, Exeter : Border Carnation 'Marie Roze.'
Mr. J. T. West, Brentwood : Dahlia 'Princess Elizabeth.'
Mr. F. G. Wood, Ashtead : herbaceous plants.

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and twelve other members present.

Awards Recommended :—

Silver Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other herbaceous plants.
To Messrs. Russell, Richmond, for aquatic and waterside plants.
To Messrs. Veitch, Exeter, for flowering shrubs.

Banksian Medal.

To Messrs. Maxwell & Beale, Broadstone, for hardy heaths.

Award of Merit.

To *Campanula speciosa* as a hardy flowering plant (votes 6 for, 3 against), from Messrs. Elliott, Stevenage. A species collected by Mr. Elliott on Montserrat. It is perennial, and forms thick woody stems from which rise the much-branched inflorescences. The flowers are bright blue, darker at the edges, widely bell-shaped, with long styles.

To *Erica vagans* 'Lyonesse' as a hardy flowering shrub (votes unanimous), from Messrs. Maxwell & Beale, Broadstone. A fine white-flowered variety of the Cornish Heath, superior to *Erica vagans alba.*

To *Gloriosa richmondensis* as a greenhouse flowering plant (votes 6 for, 2 against), from Messrs. Russell, Richmond. A handsome greenhouse plant, climbing by means of leaf-tendrils to a height of several feet and bearing large Lily-like flowers. The undulate, recurved perianth-segments are at first yellow, deepening with age to orange-red.

To *Mutisia oligodon* as a hardy flowering plant (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A dwarf species forming dense tufts of wiry climbing stems. Its grey-green woolly leaves taper to apical tendrils. The flower-heads are three inches across, the rays delicate rosy-pink, the disc of a slightly darker tint.

Cultural Commendation.

To Mr. W. F. Hamilton, gardener to Ingham Whitaker, Esq., Lymington, for *Eucalyptus ficifolia.* Several large-flowering branches of this magnificent plant were shown. The species received the F.C.C. in 1907.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks: *Campanula versicolor.*
The Donard Nursery Co., Co. Down: Erica 'St. Keverne.'
F. A. Elderfield, Esq., Stockwell Park Rd.: *Helxine Soleirolii.*
Mr. S. J. Goodliffe, Bishop's Stortford: *Verbena bononiensis.*
Mrs. Philip Martineau, Ascot: *Polianthes tuberosa.*
Mr. Amos Perry, Enfield: *Punica granatum plena.*
Rev. F. R. Rogers, Stockwell Green: *Venidium fastuosum.*

FLORAL COMMITTEE, AUGUST 14, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and twelve other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Kelway, Langport, for Gladioli.

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Gladioli.
To Mr. J. H. Pemberton, Havering, for Roses.
To Mr. H. Prins, Wisbech, for Gladioli.

Silver Banksian Medal.

To Messrs. Cuthbert, Southgate, for Gladioli.
To Mr. S. J. Goodliffe, Bishop's Stortford, for herbaceous plants.
To Mr. W. Yandell, Maidenhead, for Violas.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. H. Hemsley, Crawley, for Sidalceas.
To The Orpington Nurseries, Orpington, for Gladioli.
To Messrs. Redgrove, Borough Green, for Phloxes and Lupins.
To Messrs. Russell, Richmond, for miscellaneous flowering plants.

Selected for trial at Wisley.

Gladiolus 'T. S. Hope-Simpson' from Messrs. Kelway, Langport.

The following Dahlias were selected by the Joint Dahlia Committee:—

From Messrs. Stredwick, St. Leonards-on-Sea:
'Autumn' (Cactus), 'Carmania' (Dec.), 'Chas. F. Frowd' (Dec.), 'D. Campbell' (Dec.), 'Erecta' (Dec.), 'Fantasy' (Dec.), 'Miss Annie Lile' (Dec.), 'Mrs. A. W. Piper' (Dec.).

Other Exhibits.

Mr. J. M. Dawson, Bucksburn: Dahlia 'Auchmill Triumph.'
Messrs. Stark, Fakenham: Sidalcea 'Mrs. D. J. Coleman.'

Section B.

Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twelve other members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Prichard, Christchurch, for alpine plants.

Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other herbaceous plants.

Award of Merit.

To *Nepenthes Russellii* as an ornamental-foliaged plant for the stove (votes 6 for), from Messrs. Russell, Richmond. A hybrid Pitcher-plant, the parentage being *N. Curtisii superba* × *N. mixta*. The pitchers are about 8 inches long, green, heavily spotted and blotched with brownish-red, with a corrugated margin of crimson and a wide double fringe of the same colour extending their whole length.

To *Zauschneria californica latifolia* as a hardy flowering plant (votes 10 for), from T. Hay, Esq., Hyde Park. A tall, much-branched variety, introduced in 1850, but still uncommon in cultivation. It is very robust, forming a bushy plant 3 to 4 feet high; and does well in dry and sunny situations.

Other Exhibits.

Messrs. Bolton, Budbrook: *Scolopendrium vulgare crispum.*
Misses Hopkins, Coulsdon: rock plants.
Messrs. Russell, Richmond: *Jatropha multifida.*
Hon. Mrs. Ryder, Brockenhurst: Gazanias.
Mr. G. E. P. Wood, Ashtead: rock plants.

FLORAL COMMITTEE, AUGUST 28, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Gladioli.
To Messrs. Dobbie, Edinburgh, for Marigolds.
To Messrs. Kelway, Langport, for Gladioli.
To Messrs. Prichard, Christchurch, for Montbretias.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. T. Carlile, Twyford, for Delphiniums.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Messrs. Stredwick, St. Leonards-on-Sea, for Dahlias.
To Mr. W. Wells, Jun., Merstham, for Delphiniums and Gypsophila.

Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Cheal, Crawley, for Dahlias and Pentstemons.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. H. Hemsley, Crawley, for Sidalceas and Dahlias.
To Messrs. Langridge, Westerham, for Dahlias and Gladioli.
To Messrs. Russell, Richmond, for greenhouse plants.
To Mr. F. G. Wood, Ashtead, for herbaceous plants.
To Mr. W. Yandell, Maidenhead, for Violas.

The following plants received awards after trial at Wisley:—

Award of Merit.

To Gladiolus 'Dragon Lyonnais,' from Mr. H. Prins, Wisbech. 3 feet, unbranched, with 14 to 19 closely set flowers, 3 or 4 out at a time; flowers 3½ inches diameter, semi-double, salmon-pink, lower petal pale cream heavily speckled with deep salmon. *Primulinus grandiflorus* type. Flowering from July 20.

To Lobelia 'The Bishop' from the Rt. Rev. the Hon. B. J. Plunket (gr. Mr. P. D. Reid), Clontarf. 4 to 4½ feet tall, little branched. Foliage very dark crimson-maroon; stems of a darker shade. Flowers 1¾ inch diameter, bright rich scarlet. Of *fulgens* type. Flowering from August 2.

To Phlox 'Amami' from Messrs. Fairbairn, Carlisle. 3 feet; inflorescence closely panicled; flower $1\frac{9}{16}$ inch diameter, bright pale salmon, eye star-shaped, white. Flowering from July 12.

To Phlox 'Evangeline' from Mr. H. J. Jones, Lewisham. 2¾ feet; inflorescence closely panicled; flower 1⅝ inch diameter, salmon-pink with an irregular white band around eye. Flowering from July 18.

To Phlox 'Rachel' from H. Aldersey, Esq., Chester. 3 feet, inflorescence pyramidal; flower 1⅜ inch diameter, rich salmon-rose, flat, eye deep carmine. Flowering from July 5.

To Phlox 'Sweetheart' from Messrs. Rich & Cooling, Bath. 2¼ feet; inflorescence closely panicled; flower 1½ inch diameter, very bright rich salmon with an irregular white band around eye. Flowering from July 16.

To Sweet William 'Sweet Wivelsfield' from Messrs. Allwood, Haywards Heath. Plant bushy, 14 to 16 inches tall, dark dull green; flowers single, 1⅜ to 1½ inch diameter, much fringed, of various shades of red, pink, and magenta, with paler margins and around the eye a dark zone. Flowering from July 30.

Highly Commended.

To Godetia 'Double Shell Pink' from Messrs. Sutton, Reading. Plants much branched, 15 to 20 inches tall; flowers 2¼ inches diameter, double, flesh-pink; very free-flowering. A good true and even stock.

For awards recommended to Annual Phlox and Bedding Salvias on trial at Wisley, see pp. 427 and 234.

Selected for trial at Wisley.

Delphinium 'Porlockenya' and *D.* 'Porlockenya' *album* from G. W. W. Blathwayt, Esq., West Porlock.

Gladiolus 'Col. Sir Dennis Boles' from Messrs. Kelway, Langport.

Gladiolus 'Queen of Somerset' from Messrs. Kelway, Langport.

The following Dahlias were selected by the Joint Dahlia Committee:—

From Messrs. Cheal, Crawley:
  'Mrs. Looker' (Dec.), 'Lady Snagg' (Dec.), 'Pilatus' (Pæony).
From Mr. A. J. Cobb, Reading:
  'Yvonne Salmon' (Min. Pæony).
From Messrs. Stredwick, St. Leonards-on-Sea:
  'Fire Fly' (Cactus), 'Lord Lambourne' (Dec.), 'Mrs. C. Bradley' (Dec.), 'Mrs. John Crowther' (Cactus), 'Radiant' (Dec.), 'Rev. T. Marriott' (Dec.).
From Mr. C. Turner, Slough:
  'Sunflower' (Star).

Other Exhibits.

Misses Hopkins, Coulsdon: herbaceous plants.
Messrs. Jones Bros., Liverpool: Sidalceas.
Messrs. Ladhams, Southampton: Coreopsis 'Market Favourite.'
Mrs. N. Marriage, Warminster: Dahlia seedling.

Section B

Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and ten other members present.

Awards Recommended:—

Banksian Medal.

To Messrs. Burkwood Bros., Kingston, for Ceanothus.

Award of Merit.

To *Caryopteris mongolensis* as a hardy flowering shrub (votes unanimous), from Messrs. Veitch, Exeter. A graceful little shrub with small, ovate-lanceolate leaves of shining green, paler beneath. The blue flowers are carried in short axillary cymes.

To *Gentiana stragulata* as a hardy flowering plant (votes 7 for), from Andrew Harley, Esq., Dollar. A small-flowered Chinese species with rather curious tubular flowers. The flattened, blue corolla-limb is marked with longitudinal white lines.

To *Hippeastrum reticulatum* × 'Mrs. Garfield' as a tender flowering plant (votes unanimous), from Col. S. R. Clarke, C.B., Haywards Heath. A very beautiful species with broad green leaves and stout scapes bearing large white flowers. The perianth is heavily veined with rose-pink.

To *Hydrangea quercifolia* as a hardy flowering shrub (votes 9 for), from Col. S. R. Clarke, C.B., Haywards Heath. A deciduous species with large, lobed leaves and terminal panicles of white flowers. It is very ornamental even when not in flower.

To *Solanum pinnatum* as a tender flowering plant (votes 6 for, 3 against), from Lt.-Col. L. C. R. Messel, Handcross. A species of slender growth collected in Chile by Mr. Clarence Elliott. The bright green leaves are pinnate and rather fleshy. The small violet flowers are borne in terminal cymes.

To *Sphaeralcea acerifolia* as a hardy flowering plant (votes 8 for, 1 against), from T. Hay, Esq., Hyde Park. An uncommon North American shrub with downy leaves like those of a Maple and large, rosy-lavender, Mallow-like flowers. Probably only half-hardy in many places.

To *Zauschneria microphylla* as a hardy flowering plant (votes 8 for), from T. Hay, Esq., Hyde Park. A graceful species of tall, branching habit. The leaves are small and downy, giving the plant a greyish-green appearance: the flowers bright scarlet, produced very freely on the upper parts of the plant.

Other Exhibits.

Col. S. R. Clarke, C.B., Haywards Heath : *Rhus Osbeckii.*
Mrs. Henderson, Horsham : *Brunsvigia gigantea.*
Hollamby's Nurseries, Groombridge : Clematis.
Lt.-Col. Messel, Handcross : *Omphalogramma sp.* K.W. 6821.
H. Armytage Moore, Esq., Saintfield : *Actinidia coriacea.*
Messrs. Veitch, Exeter : Watsonias and shrubs.

FLORAL COMMITTEE, SEPTEMBER 11, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Gladioli.
To Messrs. Dobbie, Edinburgh, for Sweet Peas.
To Messrs. Prior, Colchester, for Roses.

Silver Banksian Medal.

To Messrs Allwood, Haywards Heath, for Carnations.
To Messrs. Blackmore & Langdon, Bath, for Delphiniums
To Messrs. Daniels, Norwich, for Montbretias.
To Messrs. Dickson, Newtownards, for Roses.
To Mr. H. Hemsley, Crawley, for Dahlias.
To Messrs. Ladhams, Southampton, for herbaceous plants.
To Mr. J. H. Pemberton, Havering, for Roses.
To Messrs. Prichard, Christchurch, for herbaceous plants.
To Mr. W. Wells, Jun., Merstham, for Delphiniums.

Banksian Medal.

To Messrs. Barr, Taplow, for herbaceous plants.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. F. Cant, Colchester, for Roses.
To Mr. T. Carlile, Twyford, for Delphiniums.
To Messrs. Cheal, Crawley, for Dahlias and Pentstemons.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. S. J. Goodliffe, Bishop's Stortford, for Dahlias, etc.
To Messrs. Langridge, Westerham, for Dahlias.
To Mr. W. Yandell, Maidenhead, for Chrysanthemums and Violas.
To Mr. G. E. P. Wood, Ashtead, for herbaceous plants.

Award of Merit.

To Montbretia 'Hon. Mrs. Edwin Montagu' as a tender plant for border and cutting (votes unanimous), from Hon. Mrs. Montagu (gr. Mr. J. E. Fitt), Attleborough. This beautiful Montbretia is the result of a cross between the varieties 'Nimbus' and 'His Majesty.' The flowers are very large and of a deep orange colour with a golden yellow zone round the centre lightly blotched with crimson.

To Montbretia 'Sir Matthew Wilson' as a tender plant for border and cutting (votes unanimous), from Hon. Mrs. Montagu, Attleborough. This variety resulted from a cross between M. 'Princess' and M. 'Queen Charlotte.' The colour is a very brilliant orange-red which in a good light looks almost scarlet. There is a small golden-yellow zone round the centre with carmine markings.

To Nymphaea 'Mrs. Whittaker' as a greenhouse aquatic (votes unanimous), from Mr. A. Perry, Enfield. A small-flowered pale lavender-blue Water Lily of American origin. It is sweetly scented, and is the palest blue Nymphaea yet raised.

To Nymphaea 'Panama Pacific' as a greenhouse aquatic (votes unanimous), from Mr. A. Perry, Enfield. Another American variety with small light violet-blue flowers, the sepals of which are tinted with rosy-purple when first open.

Selected for trial at Wisley.

Chrysanthemum 'Little Gem' from Mr. H. Shoesmith, Jun., Mayford.
Chrysanthemum 'Old Gold' from Mr. H. Shoesmith, Jun., Mayford.
Chrysanthemum 'Pink Domino' from Mr. A. W. Thorpe, Lichfield.
Chrysanthemum 'Robin' from Mr. A. W. Thorpe, Lichfield.
Chrysanthemum 'Royal Purple' from Mr. H. Shoesmith, Jun., Mayford.
Chrysanthemum 'The Ashes' from Mr. W. T. Roots, Cranford.

The following Dahlias were selected by the Joint Dahlia Committee :—

From Messrs. Cheal, Crawley :
'Hookwood Star' (Star), 'Mrs. Bealey' (Single), 'Mrs. Raymond Warren' (Dec.), 'Pride of Crawley' (Dec.), 'Robert' (Min. Pæony), 'Rubin' (Min. Pæony).
From Mr. C. Turner, Slough :
'White Swan' (Pæony).

Other Exhibits.

Mr. N. Baggesen, Pembury : herbaceous plants.
Farnham Royal Nurseries, Farnham Royal : Chrysanthemum 'Farnham Yellow.'
Misses Hopkins, Coulsdon : herbaceous plants.
Messrs. Ladhams, Southampton : Coreopsis 'Market Favourite.'
Mr. G. Malin, Hinckley : Dahlia 'Sylvia Malin.'
Mr. A. McAlpine, Glasgow : Chrysanthemum 'Fay Fergusson.'
Mr. H. Shoesmith, Jun., Mayford : Dahlia 'Market Red.'

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and eleven other members present.

Awards Recommended :—

Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other herbaceous plants.
To Messrs. Prichard, Christchurch, for alpine plants.
To Messrs. Russell, Richmond, for Clematis and other shrubs.

First-class Certificate.

To *Brunsdonna* × *Parkeri alba* as a hardy flowering plant (votes 11 for), from A. Worsley, Esq., Isleworth. A most beautiful and interesting bi-generic hybrid which received an **A.M.** in 1911. The present specimen is a seedling, not of the original white form, but of another albino of the same batch. A historical account of the Brunsdonnas is given by Mr. Worsley in this Journal, vol. **51**, p. 64.

Award of Merit.

To *Brunsdonna* × *blanda* as a hardy flowering plant (votes unanimous), from A. Worsley, Esq., Isleworth. This is a seedling of *B.* × *Parkeri*, and may be described as a vigorous Belladonna Lily with large fragrant flowers of rich rosy-pink, the base of the perianth flushed with deep yellow. Although hardy, the Brunsdonnas do best if grown in a cool house.

To *Bursaria spinosa* as a half-hardy flowering shrub (votes unanimous), from P. D. Williams, Esq., St. Keverne. This shrub bears evergreen, shortly-stalked obovate leaves and small whitish flowers in conspicuous terminal panicles.

To *Perowskia atriplicifolia* as a hardy flowering shrub (votes unanimous), from Major F. C. Stern, Goring-by-Sea. A sub-shrub which produces long, slender branches of grey foliage and terminal panicles of small violet flowers. The specimens submitted were exceptionally well developed.

To *Rosa* × *highdownensis* as a hardy ornamental-fruited shrub (votes unanimous), from Major F. C. Stern. The specimen shown as a natural hybrid of *R. Moyesii* differed from the type in the brighter colouring of its fruits and in its greater freedom of fruiting.

Other Exhibits.

The Curator, U.B.G., Cambridge: *Bauhinia yunnanensis.*

Sir Wm. Lawrence, Bt., Burford: *Habranthus Oberwetteri*, Colchicum 'Autumn Queen.'

H. Armytage Moore, Esq., Saintfield: *Parasyringa sempervirens, Vaccinium Mortinia.*

Messrs. Russell, Richmond: *Gloriosa grandiflora.*

Major F. C. Stern, Goring-by-Sea: *Gentiana Macauliana.*

A. Worsley, Esq., Isleworth: *Lycoris aurea.*

DAHLIA SHOW, SEPTEMBER 12, 1928.

The following Dahlias were selected by the Joint Committee for trial at Wisley:—

From Messrs. Ballego, Leiden, Holland:
  'Jersey's Beacon' (Dec.).
From Messrs. Bruidegom, Baarn, Holland:
  'Early Yellow' (Cactus).
From Messrs. Burrell, Cambridge:
  'Cicely' (Charm), 'Dorret' (Charm), 'Earldoms' (Charm), 'Hebe' (Charm), 'Lulu' (Charm), 'Lyric' (Charm), 'Onah' (Small Dec.), 'Victor' (Small Dec).
Messrs. Carlée, Haarlem, Holland:
  'Cokkie Carlée' (Cactus), 'Marchenschön' (Dec.).
From Messrs. J. Stredwick, St. Leonards-on-Sea:
  'Menin' (Dec), 'Premier' (Dec.), 'R. Findlay' (Dec.).
From Messrs. R. H. van Kattendyke, Gorsel, Holland:
  'Sunbeam' (Dec).
From Mr. C. Vianen, Rijnsburg, Holland:
  'Albastre' (Dec.).
From Messrs. Weyers, Hillegom, Holland:
  'White Wonder' (Cactus).

Dahlias were also submitted by the following:—

Messrs. Geitenbeek, Baarn, Holland.
Messrs. Hornsveld, Baarn, Holland.
Messrs. Jarman, Chard.
Messrs. P. Majoor, Baarn, Holland.
Messrs. Nagels, Antwerp.
Mr. J. Thompson, Kilwinning.
Mr. H. Woolman, Birmingham.

FLORAL COMMITTEE, SEPTEMBER 27, 1928.

Section A.

AT THE AUTUMN SHOW.

MR. H. B. MAY, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Award of Merit.

To Chrysanthemum 'Ophelia' as a greenhouse variety for market and cutting (votes unanimous), from Mr. H. Shoesmith, Jun., Mayford, Woking. A bright mauve-pink decorative variety with a yellow reverse.

To Colchicum 'Glory of Heemstede' for naturalizing (votes unanimous), from Messrs. G. C. van Meeuwen, Heemstede, Holland. A large, bright purple variety on a white ground except at the throat. It has very pretty and distinct markings.

To Colchicum 'Premier' for naturalizing (votes unanimous), from Messrs. G. C. van Meeuwen, Heemstede, Holland. This variety is of a bright rosy-mauve colour on a white ground and has a white throat.

To Colchicum 'Water Lily' for naturalizing (votes unanimous), from Messrs. G. C. van Meeuwen, Heemstede, Holland. A very distinct double variety with narrow light rosy-mauve segments.

To *Scolopendrium vulgare crispum subfimbriatum cristatum* as a hardy fern (votes unanimous), from Messrs. R. Bolton, Halstead. A very handsome frilled and curled Hart's Tongue fern with beautiful much-crested frond tips.

Selected for trial at Wisley.

Aster 'Blue Eyes' from Mr. E. Ballard, Colwall.
Aster Frikarti 'Eiger' from Sir Wm. Lawrence, Bt., Dorking.
Aster Frikarti 'Jungfrau' from Sir Wm. Lawrence, Bt., Dorking.
Aster Frikarti 'Monch' from Sir Wm. Lawrence, Bt., Dorking.
Aster Frikarti 'Wonder of Stafa' from Sir Wm. Lawrence, Bt., Dorking.
Kniphofia 'Fireflame' from Messrs. Cutbush, Barnet.
Kniphofia 'Golden Ray' from Messrs. Cutbush, Barnet.
Nerine 'Mrs. Cyril Mackworth Praed' from Col. S. R. Clarke, C.B., Cuckfield.
Phlox 'Hon. Mrs. Balfour' from Messrs. Fairbairn, Carlisle.
Solidago 'Goldstrahl' from Mr. A. Perry, Enfield.

The following Dahlias were selected by the Joint Dahlia Committee :—

From Messrs. Burrell, Cambridge :
'Ailsa' (Charm), 'Hyperon' (Charm), 'Jane' (Charm), 'Leita' (Charm), 'Nina' (Small Dec.), 'Stella' (Small Dec.).
From Messrs. Cheal, Crawley :
'Esther' (Coll.), 'Golden Star' (Star), 'Mrs. Charles Hay' (Small Dec.), 'Mrs. David Campbell' (Small Dec.), 'Mrs. David Ingamells' (Dec.), 'Mrs. J. F. McLeod' (Single), 'Mrs. Lindford' (Small Dec.), 'Southdown' (Pæony), 'Warnham Star' (Star).
From A. J. Cobb, Esq., Reading :
'Kitty Lloyd Jones' (Single), 'Mrs. A. F. Dutton' (Pæony).
From A. F. Tofield, Esq., Swaythling :
'Annie Wood' (Pæony).
From Messrs. W. Treseder, Cardiff :
'Erika' (Coll.), 'Tanglewood' (Charm).
From Mr. H. Woolman, Birmingham :
'Mrs. Wm. Clarke' (Mignon).

Other Exhibits.

Messrs. Allwood, Haywards Heath : Carnations 'Rapture' and 'Guy Allwood.'

Mr. A. J. Barrell, Bridgwater : Chrysanthemums.

Viscount Cowdray, Midhurst : Delphinium 'Miss Daphne Pearson.'

Mrs. R. Down, Teddington : seedling Dahlias.

Messrs. Engelmann, Saffron Walden : Carnations 'Gladys,' 'Wanda,' and 'Startler.'

Messrs. Haskins, Bournemouth : seedling Dahlias.

Mrs. Houlder, Epsom: Dahlia 'Ronald.'
Messrs. Kelway, Langport: Pyrethrum 'Eileen Kelway.'
Mr. C. S. Kipping, Althorne: Chrysanthemum 'Autumn Gold.'
Messrs. S. Low, Enfield: Carnation 'Thomas Ives.'
Mrs. Oram, Hanley Castle: Dahlia 'The Rhydd.'
Messrs. Prior, Colchester: Dahlia 'A. Wheeler.'
G. J. Sowerby, Esq., Scarborough: Ivy Leaf Geranium 'Tessie Sowerby.'
Messrs. Stredwick, St. Leonards-on-Sea: Dahlias.
Mr. C. Turner, Slough: Dahlias.
Mr. H. Woolman, Birmingham: Chrysanthemums.

Section B.

Mr. W. J. BEAN, V.M.H., in the Chair, and eleven other members present.

Awards Recommended:—

Award of Merit.

To *Manihot utilissima* var. *variegata* as an ornamental-foliaged stove plant (votes 8 for, 2 against), from the Director, R.B.G., Kew. A decorative plant of unusually bright colouring. The large palmate leaves are heavily variegated with yellow and are carried on long, bright red petioles. The single stem of the specimen shown was also yellow.

To *Omphalogramma elegans* as a flowering plant for rock garden and alpine house (votes 8 for), from Messrs. Oliver & Hunter, Moniaive. An attractive species collected by Forrest in Tibet The plant forms a tuft of small greyish-green woolly leaves, ovate-lanceolate in shape. The solitary, Gloxinia-like flower has a purple tube, striped internally with yellow, and blue purple-shaded lobes.

To *Protea compacta* as a greenhouse flowering plant (votes 9 for), from the Hon. Mrs. Ryder, Beaulieu. This specimen has small, ovate, greyish-green leaves of leathery texture. The plant shown carried four large flower-heads of rose-pink colour.

To *Sambucus glauca* as a hardy fruiting shrub (votes 8 for, 1 against), from Lionel de Rothschild, Esq., Exbury. An ornamental Elder with rich green pinnate foliage, white florets, and purplish-blue glaucous fruits.

Other Exhibits.

Messrs. Casburn & Welch, Cambridge: *Delphinium macrocentron.*
Messrs. Cheal, Crawley: *Cupressus Wezelenburgii.*
Messrs. Cypher, Cheltenham: *Aphelandra spp.*
Donard Nursery Co., Co. Down: *Erica stricta, Pittosporum tenuifolium tricolor.*
Messrs. Fletcher, Ottershaw: *Aucuba Sandfieldii.*
The Hon. Vicary Gibbs, Elstree: *Cotoneaster spp.*
Sir Wm. Lawrence, Bt., Burford: Colchicum 'Lilac Wonder,' *Buddleia madagascarensis, Gentiana ciliata, Rondeletia odorata.*
R. N. Macaulay, Esq., Glassamy: *Gentiana Farreri × sino-ornata.*
Mr. W. J. Marchant, Keeper's Hill Nurseries: *Malus Toringo.*
Mrs. Thornely, Nursteed: Cynoglossum 'Fairy Blue.'
Messrs. Waterer, Bagshot: *Crataegus Ferentaria.*

FLORAL COMMITTEE, OCTOBER 9, 1928.

Section A.

AT THE FRUIT AND VEGETABLE SHOW.

Mr. H. B. MAY, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended:—

Award of Merit.

To Chrysanthemum 'Golden Security' for cutting and market (votes 10 for, 1 against), from Mr. J. Barrell, Bridgwater. A useful golden-yellow incurved variety flushed with pale orange in the centre. The florets are broad and the flowers are borne on long, erect stems.

Selected for trial at Wisley.

Aster ' Excellence ' from Hon. Vicary Gibbs, Elstree.
Aster ' Lavender ' from Hon. Vicary Gibbs, Elstree.
Aster ' Maxima ' from Hon. Vicary Gibbs, Elstree.
Aster ' Preference ' from Hon. Vicary Gibbs, Elstree.
Aster ' Red Rover ' from Hon. Vicary Gibbs, Elstree.
Chrysanthemum ' Red Rover ' from Mr. H. Shoesmith, Jun., Mayford.
Nerine ' Miss Gerda Elwes ' from Mr. W. H. Walters, Colesborne.

Other Exhibits.

G. Cottrill, Esq., Taunton : Dahlias.
Farnham Royal Nurseries, Slough : Carnation ' Mrs. Cecil Moore.'

The awards recommended to Dahlias tried at Wisley were confirmed (see p. 226).

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and seventeen other members present.

Awards Recommended :—

Award of Merit.

To *Crocus karduchorum* as a hardy flowering plant (votes unanimous), from Lady Beatrix Stanley, Market Harborough. A very rare and charming species from Kurdistan. It bears some resemblance to *C. zonatus*, but differs in the bluer tone of its lavender perianth-segments and in its white throat, stamens, and stigma.

To *Rosa Davidi* as a hardy fruiting shrub (votes unanimous), from Lady Beatrix Stanley. The long, arching stems of this species are much branched and bear very numerous pink flowers followed by clusters of small, ovate, orange-scarlet fruits.

Other Exhibits.

Lady Beatrix Stanley, Market Harborough : *Rosa Prattii.*
Mr. W. H. Walters, Cheltenham : *Haemanthus hirsutus.*

FLORAL COMMITTEE, OCTOBER 30, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Mr. T. Bones, Cheshunt, for Michaelmas Daisies.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. J. H. Pemberton, Havering, for Roses.
To Messrs. L. R. Russell, Richmond, for stove plants.
To Mr. W. H. Walters, Colesborne, for Nerines.
To The Duke of Wellington (gr. Mr. H. J. Beckingham), Basingstoke, for Nerines.

Banksian Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.
To Mr. G. Reuthe, Keston, for Nerines, etc.
To Mr. G. Zambra, Dawlish, for Violets.

Award of Merit.

To Carnation ' Rapture ' for cutting (votes unanimous), from Messrs. Allwood, Haywards Heath. A bright rosy-pink perpetual-flowering variety of good form with evenly serrated petals.

To Chrysanthemum ' Matchless ' for market and cutting (votes unanimous), from Mr. H. Shoesmith, Jun., Mayford, Woking. A splendid bright yellow market decorative variety with narrow rolled florets. The large, round flowers are borne on long erect stems and being of good substance are admirably adapted for packing.

To Chrysanthemum 'Mayford Cream' for cutting and market (votes unanimous), from Mr. H. Shoesmith, Jun. This is a cream-coloured, rounded decorative variety with rolled florets.

The following Michaelmas Daisies received awards after trial at Wisley :—

Award of Merit.

AMELLUS SECTION.

To Aster 'Kobold,' from Herr G. Arends, Ronsdorf. Height 20 inches; habit compact; flowers single, 2¼ to 2¾ inches diameter, pale pink tinged lavender, of a pinker shade than 'Rudolph Goethe.' Flowering from September 8.

To Aster 'Sonia,' from Mr. T. Bones, Cheshunt. Height 26 inches, of compact habit; flowers 1¾ to 2 inches diameter, bright pale amaranth-pink. Flowering from September 12.

To Aster 'Viola,' from Mr. H. J. Jones, Lewisham. For description, see R.H.S. JOURNAL, vol. **51**, p. 102.

CORDIFOLIUS SECTION.

To Aster 'Silver Spray,' from Mr. E. Ballard, Colwall. 3¼ feet; inflorescence arching; flowers single, ½ to ⅝ inch diameter, white; petals recurved. Flowering from September 28.

NOVI-BELGII SECTION.

To Aster 'Eclipse,' from Hon. Vicary Gibbs (gr. Mr. E. Beckett), Elstree, and Mr. H. J. Jones, Lewisham. For description, see R.H.S. JOURNAL, vol. **51**, p. 107.

To Aster 'Empress of Colwall,' from Mr. E. Ballard. 3½ feet; inflorescence panicled; flowers 1½ inch diameter, double, pale lavender. Flowering from September 12.

To Aster 'Ethel Ballard,' from Mr. E. Ballard. For description, see R.H.S. JOURNAL, vol. **46**, p. 372.

To Aster 'Red Star,' from Messrs. Dickson & Robinson, Manchester. For description, see R.H.S. JOURNAL, vol. **51**, p. 105.

To Aster 'Pink Perfection,' from the Hon. Vicary Gibbs. For description see R.H.S. JOURNAL, vol. **51**, p. 104.

Highly Commended.

AMELLUS SECTION.

To Aster 'Preziosa,' from Messrs. Barr, Covent Garden, London. For description, see R.H.S. JOURNAL, vol. **51**, p. 102.

NOVI-BELGII SECTION.

To Aster 'A 1,' from Mr. T. Bones, Cheshunt. For description, see R.H.S. JOURNAL, vol. **51**, p. 106.

Other Exhibits.

Mr. S. Berry, Northwood: Chrysanthemum 'Mrs. Louie Rich.'
Mr. B. Pinney, Shipbourne: Violets.
Messrs. R. Veitch, Exeter: Nerines.

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and thirteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs.
To Messrs. Ladhams, Southampton, for shrubs and herbaceous plants.
To Messrs. Veitch, Exeter, for shrubs.

Banksian Medal.

To Messrs. Baggesen, Tunbridge Wells, for shrubs.
To Mr. S. Sims, Draycott, for shrubs.
To Messrs. Wm. Wood & Sons, Taplow, for shrubs.

Cultural Commendation.

To Mr. H. J. Beckingham, gardener to the Duke of Wellington, Ewhurst Park, Basingstoke, for *Hymenocallis littoralis.*

Other Exhibits.

Messrs. Baker, Codsall : shrubs and herbaceous plants.
The Hon. Vicary Gibbs, Elstree : *Crataegus mollicula, C. assurgens.*
Hollamby's Nurseries, Groombridge : Vitis and other shrubs.
Misses Hopkins, Coulsdon : rock plants.
Miss G. Howse, Golder's Green : miniature gardens.
Mr. J. J. Klinkert, Richmond : clipped trees.
Messrs. Ryder, St. Albans : *Iris alata delicata.*

FLORAL COMMITTEE, NOVEMBER 13, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Mr. N. C. Crone, Sewardstone, for Begonias.
To Messrs. S. Low, Enfield, for Carnations.
To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.
To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. W. Cato, Wallingford, for Begonia ' Elatior.'
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. J. J. Kettle, Corfe Mullen, for Violets.
To Mr. B. Pinney, Shipbourne, for Violets.

Award of Merit.

To Chrysanthemum ' Phineas ' for cutting and market (votes unanimous), from Mr. H. Shoesmith, Jun., Mayford, Woking. A rosy-crimson decorative variety with a bronzy-gold reverse. The florets are of medium width and the colour is particularly pleasing under artificial light.

To Chrysanthemum ' Shoreham Spray ' for cutting and market (votes unanimous), from Lord Mildmay (gr. Mr. P. E. Hulse), Shoreham Place, Kent. An excellent white spray variety, with a slight tinge of green at the centre. The flowers are of medium size and are nicely spaced in the sprays.

Cultural Commendation.

To Mr. W. Cato, Wallingford, for Begonia ' Elatior.'

Other Exhibits.

Mr. W. Butler, Hemel Hempstead : Chrysanthemum ' Miss Minnie Childs.'
Messrs. Engelmann, Saffron Walden : Carnations ' White Eldora ' and ' Early Rose.'
Mr. E. Hewitt, Send : Chrysanthemum ' Mrs. L. R. Hewitt.'
Mr. J. J. Kettle, Corfe Mullen : Violets ' Steel Blue,' ' Countess of Shaftesbury,' and ' Corfe Mullen Wonder.'
Messrs. S. Low, Enfield : Carnations ' Kathleen,' ' R. A. Nicholson,' and ' Thomas Ives.'
Sir H. Parsons, Bt., W. Norwood : Chrysanthemum ' Lady Parsons.'
Mr. R. Roger, Pickering : Primula ' Barrowby Gem.'
Messrs. Ryder, St. Albans : *Iris alata delicata* Ryder's variety.
Messrs. Thornycroft, Basingstoke : Chrysanthemum ' Audrey.'
N. T. Whitworth, Esq., Wellingborough : Chrysanthemums ' Miss M. A. Whitworth ' and ' Chester Yellow.'
J. B. Wilkinson, Esq., Chertsey : Chrysanthemum ' Silverlands Seedling.'
Mr. G. Zambra, Dawlish : Violets.

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and twenty other members present.

Awards Recommended :—

Banksian Medal.

To Mr. R. C. Notcutt, Woodbridge, for shrubs.
To Messrs. L. R. Russell, Richmond, for shrubs.
To Messrs. Wm. Wood & Sons, Taplow, for shrubs.

Award of Merit.

To *Cotoneaster Harroviana* as a hardy fruiting shrub (votes 8 for, 3 against), from G. W. E. Loder, Esq., Ardingly. An attractive species with small, dark green leaves downy beneath and very numerous light red berries in small clusters.

To *Stranvaesia Davidiana* as a hardy fruiting shrub (votes unanimous), from Lionel de Rothschild, Esq., Exbury. A most handsome plant introduced from China in 1903 and now 15 feet high at Exbury. The large clusters of bright red pendent berries are well set off by the rich green ovate-lanceolate leaves.

To *Thunbergia chrysops* as a flowering plant for the greenhouse (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A trailing species from Sierra Leone. The cordate leaves are slightly lobed. The large flowers are rich purple, shading to blue near the throat, the colour contrasting strongly with the vivid golden-yellow of the tube.

Other Exhibits.

Misses Hopkins, Coulsdon : rock plants.
Mr. J. Klinkert, Richmond : clipped trees.
Sir Wm. Lawrence, Bt., Burford : *Ranunculus calandrinioides, Acokanthera spectabilis.*
Messrs. S. Low, Enfield : *Ficus austriaca variegata, Rondeletia speciosa.*
Mr. R. C. Notcutt, Woodbridge : *Photinia villosa.*
E. M. Preston, Esq., Hayes : *Hidalgoa Werckhi.*
Mr. S. Sims, Draycott : shrubs.
Messrs. Watson, Killiney : Veronica hybrid.

FLORAL COMMITTEE, NOVEMBER 27, 1928.

Section A.

Mr. H. B. May, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Cragg, Harrison & Cragg, Heston, for Crotons.
To Messrs. Sutton, Reading, for Cyclamen.

Silver Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Cyclamen.
To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants
To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.
To Napsbury Mental Hospital, St. Albans, for Chrysanthemums.
To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Clarke, Taunton, for Chrysanthemums.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Mr. J. J. Kettle, Corfe Mullen, for Violets.
To P. Mortimer, Esq., Wimbledon, for Primulas.
To Mr. B. Pinney, Shipbourne, for Violets.

Award of Merit.

To Carnation 'Wivelsfield Buttercup' for cutting and market (votes unanimous), from Messrs. Allwood, Haywards Heath. A good, clear yellow perpetual-flowering variety of medium size and having non-bursting calyces.

To Chrysanthemum 'Aurora' as a variety for cutting and market (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A full-flowered golden-bronze decorative variety with broad florets slightly incurved.

To Chrysanthemum 'Garnet King' for cutting (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A deep garnet-crimson decorative variety raised in the United States.

To Chrysanthemum 'Gwen Rodda' for cutting (votes unanimous), from Mr. I. Rodda, Oxshott. A pure white single variety with very broad florets incurving at the tips. It resulted from a cross between the varieties 'Phyllis Cooper' and 'Mollie Godfrey.'

To Chrysanthemum 'Hilda Canning' for cutting (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A very pleasing old-fashioned Pompon variety raised in the United States. The small, round flowers are light golden-bronze in colour tinged with red at the centre.

To Chrysanthemum 'Hugh Mitchell' for exhibition (votes 12 for, 5 against), from Mr. H. Woolman, Birmingham. A large Japanese variety. The flowers are very full, and the curled florets are dark crimson in colour with a buff reverse.

To Chrysanthemum 'Joan Higgs' for cutting and market (votes unanimous), from Mr. J. W. Higgs, Horndean. An excellent pure white incurved decorative variety of medium size. It is a sport from Chrysanthemum 'Autocrat.'

To Chrysanthemum 'Mrs. O'Neill' for cutting (votes unanimous), from the Napsbury Mental Hospital (gr. Mr. W. J. Jennings), St. Albans. A pure white single variety with a golden eye. It was raised by Mr. W. J. Jennings as the result of a cross between 'Bronze Molly' and 'Sandown Radiance.' The former was the seed parent.

To Chrysanthemum 'Sonia' for cutting (votes unanimous), from Messrs. Luxford. A rosy-mauve single variety with several rows of florets. It is of excellent form and has a white zone round the disc.

To Chrysanthemum 'Splendour' for cutting and market (votes 11 for, 5 against), from Mr. H. Shoesmith, Jun., Woking. A bright fiery-red single variety with a buff reverse and an irregular yellow zone round the eye.

To Chrysanthemum 'Triumph' for cutting (votes 14 for), from Messrs. Luxford, Sawbridgeworth. A terra-cotta, Anemone-flowered variety having the inner florets quilled and the outer ones long, broad, and curled at the tips. It was raised in the United States.

Other Exhibits.

Mr. J. E. Elliott, Netley Abbey: Chrysanthemum 'Dr. Arthur Peters.'
Mr. S. Fergerson, Sleights: Chrysanthemum 'S. Fergerson.'
Mrs. Fremantle, Penn: Helichrysum 'Green Ways' Strain.
Misses Hopkins, Coulsdon: Polyanthus.
Mrs. E. W. Johnson, Tunbridge Wells: Chrysanthemum 'Mrs. E. W. Johnson.'
Mr. P. W. Johnson, Swindon: unnamed Chrysanthemum.
Mr. J. J. Kettle, Corfe Mullen: Violets 'Corfe Mullen Wonder,' 'Lady Shaftesbury,' 'Lobelia,' 'Steel Blue.'
Mr. G. Lewis, Malvern: Chrysanthemum 'Madresfield Court.'
G. Mayer, Esq., Woldingham: Hippeastrum 'Radiant Star.'
P. Mortimer, Esq., Wimbledon: *Primula obconica gigantea* 'Hamburg Market.'
G. F. Rutbell, Esq., Dunster Castle: Chrysanthemum 'Mrs. Muriel Chiswell.'
Messrs. Seaman, Staines: Lobelia 'Wedgwood.'
Mr. G. Zambra, Dawlish: Violets.

Section B.

Mr. G. W. E. Loder, F.L.S., in the Chair, and seventeen other members present.

Awards Recommended:—

Banksian Medal.

To Messrs. L. R. Russell, Ltd., Richmond, for shrubs.
To Messrs. Wm. Wood & Sons, Taplow, for shrubs.

Award of Merit.

To *Dipladenia Sanderi* as a flowering plant for the stove house (votes 6 for), from Sir Wm. Lawrence, Bt., Burford. A very beautiful climbing plant introduced from Brazil by Messrs. Sander and first flowered in this country some thirty years ago. It has thick leathery leaves 2 inches long. The flowers are almost 3 inches across, bright rose-pink with yellow throat.

Other Exhibits.

A. J. Cobb, Esq., Reading: *Myrtus communis.*
B. Scrase Dickens, Esq., Horsham: *Helleborus altifolius.*
The Hon. Vicary Gibbs, Elstree: *Cotoneaster lactea.*
Mr. J. J. Klinkert, Richmond: clipped trees.
G. Mayer, Esq., Woldingham: *Urceolina pendula, Lilium ochraceum.*
Mr. S. Sims, Draycott: dwarf conifers.
Mr. G. E. P. Wood, Ashtead: rock plants and shrubs.

FLORAL COMMITTEE, DECEMBER 11, 1928.

Section A.

Mr. H. B. MAY, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. S. Low, Enfield, for Carnations.
To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.
To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Engelmann, Saffron Walden, for Carnations.
To Messrs. Sutton, Reading, for Chrysanthemums.
To Mr. G. Zambra, Dawlish, for Violets, etc.

Award of Merit.

To Begonia 'Eges Favourite' as a greenhouse plant (votes unanimous), from Baron B. Schröder (gr. Mr. E. J. Henderson), Englefield Green. The flowers of this Begonia are larger and of a brighter pink than those of the well-known variety 'Gloire de Lorraine.' It is also considered to be a better grower and very easy to propagate. Its country of origin is given as Germany and it is also widely grown in Scandinavia.

To Carnation 'Wanda' for cutting (votes unanimous), from Messrs. Engelmann, Saffron Walden. A perpetual-flowering variety raised by the exhibitors. The blooms are of good form with fimbriated petals and of a pleasing ruby-crimson colour.

To Chrysanthemum 'Friendly Rival' for cutting and market (votes unanimous), from Messrs. Luxford, Sawbridgeworth. This bright golden-yellow Chrysanthemum was raised in the United States and is considered by many to be the best decorative variety of this colour introduced up to the present. The blooms are flattish and of good substance with broad florets.

To Chrysanthemum 'Mrs. John Norman' for cutting and market (votes 11 for), from Mr. J. Norman, Ilkeston, Derbyshire. A useful rosy-mauve decorative variety of good size. It originated as a sport from 'Gloriosa.' The florets are broad and stout and paler in colour on the reverse.

Other Exhibits.

Mr. B. Pinney, Shipbourne: Violets.
Mr. R. V. Roger, Pickering: Polyanthus 'Barrowby Gem.'
F. C. Stoop, Esq., Byfleet: Carnation 'Bertha Stoop.'
Mr. J. Thomson, Ayr: Chrysanthemum 'Margaret Thomson.'

Section B.

Mr. G. W. E. LODER, F.L.S., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Wm. Wood & Son, Taplow, for shrubs and rock plants.

Banksian Medal.

To Messrs. L. R. Russell, Ltd., for shrubs and rock plants.
To Mr. S. Sims, Draycott, for dwarf conifers.

Other Exhibits.

Sir Charles Cave, Bt., Sidmouth : *Euonymus grandiflorus.*
Misses Hopkins, Coulsdon : rock plants.
Mr. J. J. Klinkert, Richmond : clipped trees.
G. Mayer, Esq., Woldingham : *Lilium ochraceum.*
Mr. G. E. P. Wood, Ashtead : shrubs and rock plants.

BOOKS AND PAMPHLETS PRESENTED, PURCHASED, OR REVIEWED DURING THE HALF-YEAR COMMENCING JULY 1, 1928, AND DEPOSITED IN THE LIBRARY.

1 = Purchased.
2 = Sent for Review.
3 = Presented by the Secretary of State for India.
4 = ,, ,, Mr. J. Key Allen, F.R.S.A.
5 Mr. Cecil Turner.
6 the Author.
7 Lt.-Col. W. E. Lees.
8 the Royal Scottish Arboricultural Society.
9 ,, Royal Agricultural Society.
10 Mr. J. Fyfe Smith.
the Director, Missouri Botanical Gardens.

Abercrombie, John. The complete forcing-gardener. 12mo. 1781. (1)

Aengelen, Petrus van. De verstandige hovenier, over de twaelf maenden van 't jaer . . . Illus. 4to. Amsterdam, n.d. [16—]. (1)

Alphand, A. Arboretum et fleuriste de la ville de Paris. 4to Paris, 1875. (1)

Anderson, James R. Trees and shrubs: food, medicinal and poisonous plants of British Columbia. Illus. 8vo. Victoria, B.C., 1925. (5)

André, Ed. Plantes de terre de bruyères, description, histoire et culture des rhododendrons, azalées, camélias, bruyères, *Epacris*, etc. 12mo. Paris, n.d. (1)

Annals of Botany. Index vols. 31–40 (1917–26). 8vo. [1928.] (1)

Archer-Hind, *Mrs.* **[Laura].** *Transl. See* GOTHEIN, M. L.

Aulagnier, A. F. Dictionnaire des substances alimentaires indigènes et exotiques, et de leurs propriétés. 2 vols. (in 1). 8vo. Paris, 1830. (1)

Bailey, L. H. The garden lover. 8vo. New York, 1928. (2)

Barrett, Otis Warren. The tropical crops. Illus. 8vo. New York, 1928 (1)

Beal, Alvin C. The gladiolus and its culture. Illus. 8vo. New York, 1927. (1)

Berichte der Deutschen Botanischen Gesellschaft. *See* BERLIN.

Berlin.

Deutsche Botanische Gesellschaft.—Berichte. Vol. 46. Illus. 8vo. Berlin, 1928. (1)

Billiard, Raymond. L'agriculture dans l'antiquité d'après les Géorgiques de Virgile. Illus. 8vo. Paris, 1928. (1)

Bolus, H. M. Louisa. Notes on *Mesembrianthemum* and some allied genera. . . . Part 1. Illus. 8vo. Cape Town, 1928. (1)

Bostock, Frederick. Examples of Lorette pruned apple and pear bushes. Planted November, 1925, 2 and 3 year old trees. sm. 4to. Northampton, 1928. (6)

Bower, F. O. The ferns (Filicales), treated comparatively with a view to their natural classification. Vol. 3: The Leptosporangiate ferns. 8vo. Cambridge, 1928. (2)

Brenchley, Winifred E. Inorganic plant poisons and stimulants. 2nd ed. 8vo. Cambridge, 1927. (2)

Britton, N. L. Flora of Bermuda. Illus. 8vo. New York, 1918. (1)

Britton, Nathaniel Lord, & Millspaugh, Charles Frederick. The Bahama flora. 8vo. New York, 1920. (1)

Brookes, Gilbert. The complete British gardener. . . . 12mo. 1779. (1)

Brown, E. T. The easy gardening book. 8vo. 1927. (2)

Cariott, Abbé. Étude des fleurs: botanique élémentaire, descriptive et usuelle. 6th ed. Vol. iii.: Flore horticole et dictionnaire. 12mo. Lyons, 1879. (1)

Carpenter, C. F. Greeves. *See* GREEVES-CARPENTER, C. F.

Carpenter, George H. The biology of insects. Illus. 8vo. 1928. (2)

Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten. Zweite Abteilung . . . Herausg. von . . . O. UHLWORM, etc. Vol. 74. Illus. 8vo. Jena, 1928. (1)

Chanter, Charlotte. Ferny Combes. A ramble after ferns in the glens and valleys of Devonshire. 3rd ed. Col. pls. 8vo. 1857. (7)

Chasset, Louis. Essai de détermination des fruits (poires). Illus. fol. Villefranche, 1928. (1)

Cochet-Cochet, & Mottet, S. Les rosiers. 3rd ed. Illus. 12mo. Paris, 1909. (1)

Cockayne, L. Monograph on the New Zealand beech forests. Part II.: The forests from the practical and economic standpoints (N.Z. State Forest Service, Bull. 4). Illus. 8vo. Wellington, 1928. (1)

Connoissance et culture parfaite des belles fleurs. 12mo. Paris, 1696. (1)

Correvon, H. Flore coloriée de poche à l'usage dans les montagnes de la Suisse, de la Savoie, du Dauphiné, des Pyrénées, du Jura, des Vosges, etc. 2nd ed. Col. pls. 8vo. Paris, 1898. (1)

Cottage and Garden. An account of a cottage and garden, near Tadcaster. 8vo. 1797. (1)

Cran, Marion (*Mrs.* George). The joy of the ground. Illus. 8vo. 1928. (2)

Dahuron, René. Traité de la taille des arbres, et de la manière de les bien élever ; avec un nouveau traité de la culture des melons. Illus. 12mo. Liége, 1699. (1)

Dairat, J. *See* PACOTTET, P., Cultures de serres.

Dalziel, J. M. *See* HUTCHINSON, J., Flora of West Tropical Africa.

Davis, Walter. Plant propagation. Ed. by W. D. DRURY. Illus. 8vo. 1922. (1)

Dengler, Robert E. THEOPHRASTUS, de causis plantarum, book one. Text, critical apparatus, translation and commentary. 8vo. Philadelphia, 1927. (1)

Drewitt, F. Dawtrey. The romance of the apothecaries' garden at Chelsea. 3rd ed. Illus. 8vo. Cambridge, 1928. (2)

Drury, W. D. Garden animals. Friends and foes. Illus. 8vo. 1922. (1)

Edinburgh.

Royal Scottish Arboricultural Society. Library regulations and catalogue. 8vo. Edinburgh, 1928. (8)

Ellis, E. T. [*Ed.*]. Black's gardening dictionary. 2nd ed. 8vo. 1928. (2)

Engler, A. Das Pflanzenreich.

—— —— 93. NIEDENZU, F. Malpighiaceae. Part ii. 1928. (1)

—— —— 94. NIEDENZU, F. Malpighiaceae. Part iii. 1928. (1)

Ermenonville. Promenade ou itinéraire des jardins d'Ermenonville. Illus. 8vo. Paris, 1788. (1)

Fischer, C. E. C. *See* GAMBLE, J. S., Flora of Madras.

Fortune, Robert. Two visits to the tea countries of China and the British tea plantations in the Himalaya. . . . 3rd ed. 2 vols. Illus. 8vo. 1853. (1)

Gamble, J. S. Flora of the Presidency of Madras. Pt. 8 [continued by] C. E. C. FISCHER. 8vo. 1928. (3)

Gardening Hints. Five hundred gardening hints. By 500 Gardeners. 8vo. 1928. (2)

Gardner, W. Fertilisers and soil improvers, description, application and comparative value. 8vo. 1927. (1)

Gaussen, H. Végétation de la moitié orientale des Pyrénées, sol, climat, végétation. Illus. 8vo. Paris, 1926. (1)

Gentil, A. Dictionnaire étymologique de la flore française. sm. 8vo. Paris, 1923. (1)

Gérardin, R. L. An essay on landscape ; or, on the means of improving and embellishing the country round our habitations. Translated from the French [by DE LILLE]. 8vo. 1783. (1)

Godron, D. A. Flore de Lorraine. 2nd ed. 2 vols. 12mo. Nancy, 1861. (1)

Gothein, Marie Luise. A history of garden art. Ed. by WALTER P. WRIGHT. Transl. from the German by *Mrs.* ARCHER-HIND. 2 vols. Illus. 8vo. London & Toronto, 1928. (2)

Greeves-Carpenter, C. F. The care of ornamental trees in planting, fertilizing, pruning, tree surgery, and spraying. 8vo. New York, 1928. (2)

Griffiths, David. The production of tulip bulbs. (U.S. Dept. Agr. Bull. 1082). Illus. 8vo. Washington, 1922. (1)

Groen, Jan van der. Den Nederlandtsen hovenier, zijnde het I. deel van het vermakelijck landt-leven. Illus. 4to. Amsterdam, 1670. (1)

—— —— For Deel II. and III. of the Series, *see* NYLANDT, P.

Hartlib, Samuel. His legacy of husbandry. sm. 4to. 1655. (1)

Hetley, Mrs. Charles. The native flowers of New Zealand. Col. pls. fol. 1888. (1)

Hibberd, Shirley. The seaweed collector. . . . Col. pls. Illus. 8vo. n.d. (4)

Holman, Richard M., & Robbins, Wilfred W. Elements of botany. Illus. 8vo. New York, 1928. (2)

Hort, Arthur F. The unconventional garden. 8vo. 1928. (2)

Humbert, Henri. Végétation du Grand Atlas marocain oriental. Exploration botanique de l'Ari Ayachi. (Bull. Soc. Hist. Nat. Afr. Nord, xv.) Illus. 8vo. Algiers, 1924. (1)

Hume, H. Harold. The cultivation of citrus fruits. Illus. 8vo. 1926. (2)

Hutchinson, J. The families of flowering plants: I. Dicotyledons. Arranged according to a new system based on their probable phylogeny. Illus. 8vo. 1926. (1)

Hutchinson, J., & Dalziel, J. M. Flora of West Tropical Africa. Vol. 1, Pt. 2. Illus. 8vo. 1928. (1)

Johnson, A. T. The hardy heaths and some of their nearer allies. Illus. 8vo. 1928. (2)

Johnstone, Mary A. Plant ecology. The distribution of vegetation in the British Isles, arranged on a geological basis. Illus. 8vo. 1928. (2)

Journal (The) of Ecology. Ed. for the British Ecological Society by A. G. TANSLEY. Vol. 16. Illus. 8vo. Cambridge, 1928. (1)

Kalendarium Universale: or, the gardener's universal calendar. 12mo. 1726. (1)

Kerner, A. Die Cultur der Alpenpflanzen. 8vo. Innsbruck, 1864. (1)

Kirk, J. W. C. A British garden flora. . . . Illus. 8vo. 1927. (2)

Kniep, Hans [*Ed.*]. *See* ZEITSCHRIFT FÜR BOTANIK.

Kraemer, H. Scientific and applied pharmacognosy. 3rd ed. *See* NEWCOMB, E. L., AND OTHERS.

Lawson, William. A new orchard and garden. . . . reprinted from the third edition with a preface by ELEANOUR SINCLAIR ROHDE. Illus. 8vo. 1927. (1)

Leclerc du Sablon, Mathieu. Nos fleurs, plantes utiles et nuisibles. Col. pls. Illus. 4to. Paris, n.d. (1)

[Ligne, Prince de.] Coup d'œil sur Beloeil et sur une grande partie des jardins de l'Europe. Nouvelle éd. 8vo. Beloeil, 1786. (1)

London.

Royal Agricultural Society. Agricultural research in 1927. 8vo. 1928. (9)

Royal Horticultural Society.

Pamphlets by Various Authors. Fruit and vegetable bottling, pulping, drying, and canning. . . . By VINCENT and GEORGIANA BANKS. Ed. by W. WILKS. Revised. 8vo. 1928.

Lyons.

Association Horticole Lyonnaise. Lyon-horticole. Revue bi-mensuelle d'horticulture . . . Rédacteur en chef, VIVIAND-MOREL. Vols. 18–31. Illus. 8vo. Lyons, 1896–1909. (1)

McLaren, John. Gardening in California, landscape and flower [3rd ed.]. Illus. 8vo. San Francisco, 1924. (10)

Macmillan, H. F. Tropical gardening and planting, with special reference to Ceylon. 3rd ed. Illus. 8vo. Colombo, 1925. (1)

Marshall, Ottoline. Practical gardening for children. 8vo. [1928.] (2)

Mason, A. Freeman. Spraying, dusting and fumigating of plants. Illus. 8vo. New York, 1928. (2)

May, Henry B. Seventy years in horticulture. Illus. 8vo. 1928. (6)

Merrill, E. D. A flora of Manila. 8vo. Manila, 1912. (1)

Mottet, S. *See* COCHET-COCHET, Les rosiers.

New York.

New York Botanical Garden. North American flora. Vol. iii. pt. 1; vi. pt. 1; vii. pts. 1–11; ix.; x. pts. 1–4; xiv. pt. 1; xv. pts. 1–2; xvi. pt. 1; xvii. pts. 1–3; xxi. pts. 1–3; xxii. pts. 1–6; xxiv. pts. 1–4; xxv. pts. 1–5; xxix. pt. 1; xxxii. pts. 1–2; xxxiii. pt. 1; xxxiv. pts. 1–3. 8vo. New York, 1905–26. (1)

Torrey Botanical Club.—Bulletin. Vol. 55. Illus. 8vo. New York, 1928. (1)

Newcomb, Edwin L., & others [*Eds.*]. Kraemer's scientific and applied pharmacognosy. 3rd ed. Illus. 8vo. New York, 1928. (1)

Nyland, P. *See* NYLANDT, P.

Nylandt, Petrus. De nieuwe verstandigen hovenier, over de twaelf maenden van 't jaer. Zijnde het II. deel van het vermakelijck landtleven. . . . 4to. Amsterdam, 1670. (1)

For Deel I. of the series, *see* GROEN, J. VAN DER.

—— Den ervaren huys-houder; zijnde het III. deel van het vermakelijck landt-leven . . . (Den naerstigen byen-houder . . . —De verstandige kock . . .). 4to. Amsterdam, n.d. [1670 ?]. (1)

Oltmanns, Friedrich [*Ed.*]. *See* ZEITSCHRIFT FÜR BOTANIK.

Pacottet, P., & Dairat, J. Cultures des serres . . . Introduction par P. REGNARD. Illus. 12mo. Paris, 1910. (1)

Pass, C. van de. Hortus Floridus, the first book. Contayninge a very lively and true description of the flowers of the springe. With a preface by ELEANOUR SINCLAIR ROHDE and calligraphy by MARGARET SHIPTON. Illus. obl. 4to. 1928. (1)

Pocket-Companion. The gentleman's, traveller's, husbandman's and gardener's pocket-companion. 8vo. n.d. (1)

Pottinger, E., & Prain, D. A note on the botany of the Kachin Hills North-east of Myitkyina. (Rec. Bot. Surv. India, i.) 8vo. [Calcutta, 1898.] (1)

Prain, *Sir* David. *See* POTTINGER, E. Botany of the Kachin Hills.

Pretty, Edward. A practical essay on flower painting in water colours. Pls. obl. fol. 1810. (7)

Quin, Charles W. Garden receipts. 6th ed., enlarged . . . by HIGGOTT OWEN. 2nd impr. 8vo. 1928. (2)

Ramann, E. The evolution and classification of soils. Transl. by C. L. WHITTLES. 8vo. Cambridge, 1928. (2)

Regnard, Paul. *See* PACOTTET, P., & DAIRAT, J.

Rey-Pailhade, Constantin de. Les fougères de France. Illus. 8vo. Paris, 1893. (1)

Rivière, Auguste. Traité d'arboriculture fruitière. Considérablement augmenté et publié par GUSTAVE RIVIÈRE. Illus. 4to. Villefranche, 1928. (1)

Robbins, Wilfred W. *See* HOLMAN, R. M., Elements of botany.

Rockwell, F. F. Evergreens for the small place. Illus. 8vo. New York, 1928. (2)

Rohde, E. S. *See* LAWSON, W., A new orchard and garden. 1927.

—— *See* PASS, C. VAN DE. 1928.

Rozier, François. Cours complet d'agriculture. . . . Par une Société d'Agriculteurs, rédigé par l'Abbé ROZIER. 10 vols. Illus. 4to. Paris, 1793–1800. (1)

S., F. V. Den verstandighen hovenier, over de twaelf maenden van 't jaer . . . Illus. 4to. Antwerp, 1667. (1)

St. Louis.

  Missouri Botanical Garden.—Bulletin. Vol. 16. Illus. 8vo. St. Louis, 1928. (11)

Sanders, T. W. Popular hardy perennials. Rev. by A. J. Macself. Col. pls. Illus. 8vo. 1928. (2)

—— The amateur's greenhouse. 7th ed. Col. pls. Illus. 8vo. [1928.] (2)

Schneider, George. Choice ferns for amateurs: their culture and management in the open and under glass. Illus. 8vo. 1905. (1)

Scidmore, Eliza Rahamah. Java. The garden of the east. Illus. 8vo. New York, 1907. (1)

Shipton, Margaret. *See* Pass, C. van de. 1928.

Shuttleworth, Margaret A. A practical botany for matriculation. Illus. 8vo. 1928. (2)

Sinnott, Edmund W. Laboratory manual for elementary botany. 8vo. 1927. (2)

Tchihatcheff, Pierre de. Asie Mineure: description physique, statistique et archéologique de cette contrée. 3me partie. Botanique. 2 vols. 8vo. Paris, 1860. (1)

——— Atlas. 4to. (1)

Thomas, H. H. Herbaceous border flowers. Illus. 8vo. 1928. (2)

Thomas, William Sturgis. Field book of common gilled mushrooms. With a key to their identification and directions for cooking those that are edible. Col. pls. 8vo. New York, 1928. (2)

Trabut, L. L'arboriculture fruitière dans l'Afrique du Nord. Fasc. i [all published]. Illus. 8vo. Algiers, 1921. (1)

Traill, Catherine Parr. Studies of plant life in Canada; or gleanings from forest, lake and plain. Col. pls. 8vo. Ottawa, 1885. (1)

Trouvelot, Bernard, & Willaume, Fernand. Manuel-guide des traitements insecticides et fongicides des arbres fruitiers. 2nd ed. Illus. 8vo. Paris, 1927. (1)

Uhlworm, Oscar [*Ed.*]. *See* Centralblatt für Bakteriologie.

Verklaringe van verscheyden kunst-rijcke wercken en hare beweginghe, door oorlogie-werck gedreven, benevens een sur schoone fonteyn, zijnde een Triumph van Bachus en Ariadne. . . . Illus. 4to. Amsterdam, 1668. (1)

  Bound with Groen, J. van der, Den Ned. hovenier, 1670.

Walcott, Mary Vaux. North American wild flowers. Vols. 1–3. Col. pls. 4to. Washington, D.C. 1925. (1)

Warner, Ralph. Dutch and Flemish flower and fruit painters of the seventeenth and eighteenth centuries, with introduction by Thomas Rohan. Illus. 4to. 1928. (1)

Willaume, Fernand. *See* Trouvelot, B., Manuel-guide.

Wilton Garden. Hortus Pembrochianus. Le jardin de Vuilton, construit par le . . . Comte de Pembrooke [gravé par Isaac de Caus]. Facsimile reprint. obl. fol. n.p. 189—. (1)

Wister, John C. The iris. A treatise on the history, development and culture of the iris for the amateur gardener. Illus. 8vo. New York, 1927. (1)

Woodward, Marcus. How to enjoy garden flowers. 8vo. 1928. (2)

Woolley, R. V. Giffard. Herbaceous borders for amateurs. Illus. 8vo. 1926. (1)

Wright, Walter P. The perfect garden: how to keep it beautiful and fruitful. 2nd ed. Illus. 8vo. 1928. (2)

Wright, W. P. [*Ed.*]. *See* Gothein, M. L.

Yeo, J. Burney. Notes on a season at St. Moritz in the Upper Engadine . . . 8vo. 1870. (1)

  Contains: Notes on the flora of St. Moritz and Tarasp.

Zeitschrift für Botanik. Herausg. von Hans Kniep und Friedrich Oltmanns. Vol. 20. Illus. 8vo. Jena, 1927. (1)

DONORS OF SEEDS, PLANTS, BOOKS, &c., TO THE SOCIETY'S LABORATORY AND GARDEN AT WISLEY DURING THE YEAR 1928.

Aberconway, Lady, Tal-y-Cafn. *Tulipa* sp.
Aldersey, H., Chester. Phlox for trial.
Alexander & Brown, Messrs., Perth. Brussels Sprouts for trial.
Algiers University. Collection of seeds.
Allen, J. K., Gillingham. Books for Library.
Allwood Bros., Messrs., Haywards Heath. Sweet William for trial.
Amsterdam Botanic Garden. Collection of seeds.
Arends, Messrs. G., Ronsdorf. Saxifrages for trial.
Arnold, Mrs. J. Plant of Viola from Balkans.
Atkins, Mrs. A. M., Sudbury. Seed of *Aristolochia* sp. from Africa.
Atlee Burpee, Messrs., U.S.A. Carrots, Egg Plants, Salvias, Phlox, Beans, for trial.
Baker, G. P., Sevenoaks. Hemerocallis for trial.
Bakers, Messrs., Wolverhampton. Delphinium, Phlox, for trial.
Balcombe, Mr., Sindlesham. Seeds and seedlings of *Campanula Vidallii.*
Balfour, Williamson & Co., Messrs., London. Insecticide "Nicona Brand" for trial.
Ballard, E., Malvern. Asters and Auriculas for trial.
Ballego & Sons, Messrs., Leiden. Dahlia for trial.
Barbier & Co., Messrs., France. Roses for trial.
Barker, Prof., Bristol. Apple buds for trial.
Barlow, C. J., Guildford. Seed of *Campanula Rapunculus.*
Barr, Messrs., Covent Garden. Seed of *Nerine Bowdeni*; seed and plants of Egg Plants, Capsicums, Broccoli, Beet, Lupins, Phlox, Salvia, Brussels Sprouts, Carrots, Broad Beans, Saxifrages, Canterbury Bells, Irises, Narcissi, Hemerocallis, Lupins, Veronicas, for trial; seed of *Romulea purpurascens*; seed of *Abronia latifolia*; Cucumber for trial.
Barry, E. E., Italy. Collection of seeds.
Bartholomew, A. C., Reading. Collection of seeds.
Basel Botanic Garden. Collection of seeds.
Bates, E. J., Charlbury. Shoots of 'Whiting Pippin' Apple for trial.
Bath, Messrs., Wisbech. Carrots, Daffodils, Iris, for trial; *Anemone blanda.*
Bathurst, J. A., Hawkhurst. Magnolia seed.
Bayer Products, Messrs., London. "Venetan" and "Aphidon" for trial.
Bear, E. M., Hailsham. Cuttings of Red Currants for trial.
Benary, Ernst, Erfurt. Carrots, Phlox, Lupins, Salvias, for trial.
Bennett, J. C., British Columbia. Collection of seeds.
Betts, Son & Browning, Messrs., London. "Harti-rido-pest" for trial.
Biggleston, Mrs., Canterbury. Bulbs and corms.
Biggleston, M., Canterbury. Seeds from Uganda.
Bilby, T. C., New Zealand. Gladioli for trial.
Bilney, W. A., Newbury. Narcissi for meadow.
Bodger & Sons., Messrs., California. Asters, Calendula, Eschscholzia, Larkspurs, for trial.
Bones, T., Cheshunt. Aster for trial.
Bonn Botanic Gardens. Collection of seeds.
Booth, F. H. A., Chiddingfold. Collection of seeds.
Bostock, F., Northampton. Grafts of Apple 'Perkins A1' for trial.
Botanic Garden, Oxford. Collection of seeds.
Bowden, W. D., Sierra Leone. Seed of *Thunbergia chrysops.*
Bowles, E. A., Waltham Cross. Cuttings of *Calluna vulgaris*; Crocus corms for Alpine meadow; *Crocus chrysanthus* corms.
Bremen Botanic Garden. Collection of seeds.
Breslau Botanic Garden. Collection of seeds.
Bridgeford, J. M., London. Seed of *Lilium longiflorum.*
Bristol University Botanic Garden. Seeds of *Abutilon indicum, Primula reclusa.*
British Columbia Expedition. Collection of seeds.
Brooklyn Botanic Garden. Collection of seeds.
Brousson, H. L., Blackheath. Dahlia for trial.

Bruidegom, Messrs., Baarn. Dahlia for trial.

Bryans, Mrs., Holmwood. Plants of Double Primrose.

Bucharest Botanic Garden. Collection of seeds.

Bunting, Messrs. G. A., London. Brussels Sprouts, Carrots, Beet, Salvias, for trial.

Burbage Nurseries, The, Hinckley. Roses for trial.

Burn-Murdoch, Mrs., Doune. Double White Primroses.

Burrell & Co., Messrs., Cambridge. Dahlia for trial.

Butler, A. F., Honduras. Seed of *Erythrina* sp., *Castilloa elastica*, Tomato 'Marglobe,' *Bauhinia* sp.

Button, C. E., Upminster. Haworthias and Aloes.

Byng of Vimy, Lady, Thorpe-le-Soken. Iris for trial.

Caley, G., Burnham. Grafts of Plum 'Marjories Seedling' for trial.

Cambridge Botanic Garden. Collection of seeds.

Cameron, Dr. A. F. Seedling Paulownias.

Campbell, D., London. Wallflower, Pansy and Centaurea plants.

Campbell, H., Cyprus. Collection of seeds from Cyprus.

Campbell, W. N., California. Seed of Watsonia hybrids.

Caparne, W. J., Guernsey. Irises for trial.

Carter & Co., Messrs., Raynes Park. Beet, Brussels Sprouts, Broccoli, Carrots, Beans, for trial.

Carter Page & Co., Messrs., London Wall. Polyanthus seed.

Cave, L., Dovercourt. Auricula for trial.

Cernauti Botanic Garden, Roumania. Collection of seeds.

Chaplin, D., Ascot. Plants of Violas for trial.

Chapman, Messrs. H., Rye. Seeds of Capsicum 'Rotherside Mammoth' for trial.

Cheal, J., Crawley. Apple and Dahlias for trial.

Chittenden, F. J., Wisley. Seed of *Candollea montana*; purple-flowered Bean; *Berberis Thunbergii*; *Papaver pilosum*; *Prunus glutinosa.*

Clarke, Col. R. Stephenson, Cuckfield. Anemones and Crocuses, Fritillarias, Daffodils, Geranium, for meadow.

Clibrans, Ltd., Messrs., nr. Manchester. Beet, Brussels Sprouts, for trial.

Clucas, Messrs., Ormskirk. Carrots, Brussels Sprouts, Beet, Broad Beans, for trial.

Cobb, A. J., Reading. Dahlias for trial.

Coimbra Botanic Garden. Collection of seeds.

Compagnie Commerciale du Nord, Messrs., London. "Amoa Premex" Insecticide and "Amoa Premex" Oil Soil Sterilizer, for trial.

Cooper, Taber, Messrs., London. Broad Beans, Beet, Salvia, Carrot, Brussels Sprouts, Broccoli, Dwarf French Beans, for trial.

Copenhagen Botanic Garden. Collection of seeds.

Corsar, K. C., Edinburgh. Auricula for trial.

Cory, R., Duffryn. Fuchsia for trial.

Cory, R., Cardiff. Collection of Anemones.

Cox, L. H., Newick. Saxifrages, Auricula, Lupin, for trial.

Cox, V. M., Sherborne. Seed of *Meconopsis* sp. from Darjeeling.

Crane, D. B., Merton. Buds of Cherry seedling for trial.

Cranfield, W. B., Enfield Chase. Daffodils for trial.

Craven & Co., Messrs., Evesham. "Carbo-Craven" Tar Oil Winter Wash; "Amberol," "Takitak," "Ca-we-Co 2" traps, "Slug Tice," for trial.

Crimea Botanic Garden. Collection of seeds.

Croatia Botanic Garden. Seed of *Pinus Peuke.*

Cullen & Sons, Messrs., Witham. Brussels Sprouts, Beet, Broccoli, for trial.

Curtis, C. L., Chatteris. Broccoli for trial.

Daehnfeldt & Jensen, Messrs., Denmark. Lupins, Brussels Sprouts, Carrots, for trial.

Dahlem Botanic Garden. Collection of seeds.

Daniel Bros., Messrs., Norwich. Canterbury Bells, Beet, Brussels Sprouts, for trial.

Darmstadt Botanic Garden. Collection of seeds.

Darnley, The Earl of, Horley. Lupin for trial.

Davidson, Professor, Vancouver University. Collection of seeds.

Dawkins, A., Chelsea. Canterbury Bells, Polyanthus, Dahlias, for trial.

Day, E. J., Pyrford. Raspberry canes for trial.

Dickson & Robinson, Messrs., Manchester. Seed of New Winter Kale; Brussels Sprouts, Broad Beans, Lupins, for trial.

Dickson & Sons, Messrs. A., Belfast. Beet for trial.

Divers, W. H., Surbiton. Polyanthus 'J. H. Page.'

Dobbie & Co., Messrs., Edinburgh. Broad Beans, Phlox, Lupins, Carrots, Broccoli, Brussels Sprouts, Beet, Canterbury Bells, Cabbage, for trial.
Dorpat Botanic Garden. Collection of seeds.
Downham, T., Galgate. Lupin for trial.
Dresden Botanic Garden. Collection of seeds.
Duncan, G., Isleworth. Plants of Primulas and Papaver.
Duncan & Davies, Messrs., New Zealand. Plants of Leptospermum.
Dunedin Botanic Garden. Collection of seeds.
Durham, F. R., R.H.S. Hall. Seed of *Sempervivum, Tecoma* sp.
Dutton, Messrs. A. F., Iver. Carnation for trial.
Edinburgh Botanic Garden. Collection of seeds.
Egmond, W. van, Holland. Trollius for trial.
Elliott, C., U.S.A. Bean for trial.
Fairbairn & Sons, Messrs., Carlisle. Phlox 'Amami' for trial.
Fenwick, G., Stamford. Seed of *Lilium Willmottiae*; seedlings of *Lilium regale.*
Fenwick, M., Stow-on-the-Wold. Collection of seeds. Plants of *Anemone nemorosa Alleni*, Gynerium 'Silverwings.'
Ferens, R. Seed of Campanula 'Profusion.'
Finney, Messrs., Newcastle. Brussels Sprouts for trial.
Forbes, J., Hawick. Hemerocallis, Auriculas, for trial.
Francillon, F. J., Lyme Regis. Seed of *Lonicera Griffithii.*
Fremantle, Mrs., Penn. Seed of Helichrysum 'Greenways Strain.'
Frikart, C., Switzerland. Collection of seeds.
Gardner, R. C. B., Northwood. Collection of seeds.
Geneva Botanic Garden. Collection of seeds.
Gilbert, Dr., U.S.A. Dahlia seed.
Gilbert, B. E., U.S.A. Seed of Dahlias and *Papaya* sp.
Giles, W. F. Seed of Leek 'Royal Favourite.'
Gill, R. G., Penrhyn. Rhododendron plants and seedling.
Glasgow Botanic Garden. Collection of seeds.
Gotenburg Botanic Garden. Collection of seeds.
Göttingen Botanic Garden. Collection of seeds.
Goude, H., Norwich. Apple for trial.
Grenfell, A. P., Bridgwater. Strawberry plants for trial.
Gresham, Capt., Purley. Collection of seeds.
Gröningen Botanic Garden. Collection of seeds.
Gunther, C. E., London. Seed of *Ilex paraguayensis.*
Haage & Schmidt, Messrs., Erfurt. Canterbury Bells for trial.
Haarer, A. E., Tanganyika. Seed of *Polycline* sp., *Rubus* sp.; books for Library.
Hamburg Botanic Garden. Collection of seeds.
Hansen, J., Aldwych. "Crab" hedge clipper for trial.
Hanwell, Mrs., London. Anemone seed.
Harkness & Sons, Messrs., Yorks. Lupins for trial.
Harley, F. C., Blinkbonny. Collection of seeds.
Harrison & Sons, Messrs., Leicester. Carrot, Beet, Broccoli, Brussels Sprouts, Broad Beans, Dwarf French Beans, for trial.
Harvey, Messrs. J. P., Kidderminster. Beet, Broad Bean, Carrot, Brussels Sprouts, Broccoli, for trial.
Hay, T., Hyde Park. Collection of seeds; *Triteleia uniflora coerulea*; plants of *Tulipa chrysantha.*
Heidelberg Botanic Garden. Collection of seeds.
Heinemann, Messrs. F. C., Erfurt. Salvias, Phlox, Brussels Sprouts, Lupins, for trial.
Henderson, W. Scott, Tadworth. Seed of *Papaver alpinum, Aquilegia alpina, Campanula Allionii.*
Herb, M., Naples. Egg Plants, Capsicums, Broccoli, Salvias, for trial.
Herbert, C. H., Birmingham. Pinks for trial.
Herring, Miss, Wraysbury. Plants of *Iris Milesii.*
Hill, E., Weybridge. Scions of Apple 'High View Pippin' for trial.
Hill, H., Exeter. Brussels Sprouts for trial.
Hillier, Messrs., Winchester. Plants of Pinus and Cupressus; collection of herbaceous plants and shrubs.
Hine, T. G. M., Slapton. Primrose with petaloid calyx.
Hope, Mrs. J., Uckfield. Iris from Palestine.
Houghton, Mrs., Boston. Plants of *Dodecatheon Meadia alba, Spigelia marylandica.*
Hurst & Son, Messrs., London. Seed of *Lupinus nanus*, Beet, Carrot, Brussels Sprouts, Broad Beans, Canterbury Bells, Salvia, for trial.

Hutcheson, Miss. Seed from Greenland Expedition.

Ingleby, Mrs., Torquay. Seed of Convolvulus, Wild Laburnum from South Africa, *Venidium fastuosum*.

Ingram, Collingwood, Benenden. Seed of *Leucospermum mixtum*.

Jekyll, Miss, Godalming. Cuttings, seeds and plants.

Jenkin, Dr., Hindhead. Plants of *Primula Winteri*; collection of Rock plants.

John Innes Horticultural Institution, Merton. Fuchsia.

Johnson, Messrs. W. W., Boston. Carrots, Salvias, for trial.

Jones, Dr. Neilson, Beaconsfield. Plant of *Rhaponticum coeruleum*.

Jones, Col. Gavin, Letchworth. Aubrietia for trial; *Rudbeckia purpurea, Letchworth var.*; seed of Dianthus 'Arthur Borton.'

Jones, H. J., Lewisham. Phlox for trial; plants of Phlox 'Daily Sketch' and 'Evangeline'; seed of Polyanthus.

Jordan, F., Lingfield. Crocuses for meadow.

Jordan & Addington, Messrs., St. Neots. Brussels Sprouts for trial.

Kelway & Son, Messrs., Langport. Seed of Veronicas, Beet, Brussels Sprouts, Carrots, Broad Beans, Delphiniums, Gladiolus, Dwarf French Beans, Lupins, Hemerocallis, for trial.

Kendrew, Miss L., Gomshall. Seed of *Leucodendron argenteum*.

Kenford, Ltd., Messrs., London. Sundries for trial.

Kent, Mrs. P., Africa. Seeds of Honeysuckle.

Kent, W. G., Wisbech. Grafts of Apple 'Hunter's Majestic' for trial.

Kent & Brydon, Messrs., Darlington. Carrots, Brussels Sprouts, Salvias, for trial.

Kettle, J. G., Corfe Mullen. Canes of Raspberry 'Lord Lambourne' for trial.

Kew, Royal Botanic Gardens. Collection of seeds; seed of *Althaea setosa*.

King, E. W., Coggeshall. Brussels Sprouts, Broad Beans, for trial.

Kingdon Ward Expedition, per F. E. Milburn, London. Collection of seeds.

Kingdon Ward's Expedition, Capt. Collection of seeds.

Kirkpatrick, Mrs., Merstham. Bulbs of *Zephyranthes* sp.

Kirsch, C., Beckenham. Plant of *Epigaea asiatica*.

Königsberg University Botanic Garden. Collection of seeds.

Lacaita, C., Petworth. Bulbs of *Scilla Paui*.

Ladds, Messrs., Swanley. Fuchsias, Pelargoniums, for trial.

Ladhams, B., Southampton. Coreopsis and Hemerocallis, for trial.

Laing & Mather, Messrs., Kelso. Beet, Brussels Sprouts, for trial.

Lane, Messrs., Berkhamsted. Grafts of Apple 'Lane's Oaklands' for trial.

Lankester, P. Seed of *Luculia Poinciana*.

Lawrence, Sir Wm., Dorking. Seed of *Gentiana pyrenaica, Chrysanthemum Mawii*; *Laurentia tenella*; plants of Pelargonium for trial.

Laxton Bros., Messrs., Bedford. Apple buds.

Leendus, Messrs. M., Holland. Roses for trial.

Leiden Botanic Garden. Collection of seeds.

Lemperg, Dr., Steirmark. Collection of seeds.

Leningrad Botanic Garden. Collection of seeds.

Ling Botanic Garden, Austria. Collection of seeds.

Lloyd Botanic Garden, Darjeeling. Collection of seeds.

Lloyds & Co., Messrs., Letchworth. Manure distributor for trial.

Lobjoit, Sir Wm., Woburn. Chionodoxas and Fritillaria for rock meadow; cuttings of Red Currant for trial.

Loder, G. W. E., Ardingley. Collection of seeds.

Lofthouse, A., Middlesbrough. Collection of Rock seeds.

Lubbe & Son, Messrs., Holland. Kinphofias for trial.

Ludwig & Co., Messrs., Holland. Dahlia for trial.

Lyon Botanic Garden, France. Collection of seeds.

Lyttel, Prof., Southampton. Plants of *Ipomoea Leerii, Cupressus Lawsoniana* and *C. Elwoodii*.

MacColl, Mrs., Harrogate. Polyanthus for trial.

McCormick, Miss, Co. Meath. Jamberry plants for trial.

McKenzie, Mrs., Alverstoke. Journal back numbers.

Maclachlan, G. Seed of Cytisus with fasciated stem.

Magor, E. P., St. Tudy. Seedlings of *Enkianthus campanulatus*.

Majoor, P., Baarn. Dahlia for trial.

Mann, W., Dunstable. Plant of *Lathyrus* sp.

March, E., Haslemere. Collection of seeds.

Marshall, Mrs., Ambleside. Seed of *Notospartium Carmichaeliae*; *Impatiens Noli-me-tangere*.

MASON, Dr. A., Walton. Seed of *Iris Kaempferi.*

MASON, H. H., Reigate. Raspberry for trial.

MASTERS, HEDLEY, Hartlebury. Brussels Sprouts for trial.

MATTOCK, J., Oxford. Dahlia for trial.

MAW, Miss, Merstham. Viola 'Benthall.'

MAY, Lady, St. Tudy. Seed of yellow-flowered plant from Tanganyika.

MELBOURNE BOTANIC GARDENS. Collection of seeds.

MEYER, Rev. ROLLO, Hertford. *Iris reticulata* 'Cantab.'

MEYERS, C. A., Holland. Dahlia for trial.

MICHIGAN BOTANIC GARDEN. Collection of seeds.

MIDDLEHURSTS, Messrs., Liverpool. Brussels Sprouts, Broad Beans, Beet, for trial.

MONCKTON, C. C. F., Jersey. *Rosmarinus* sp ?

MONRO, Messrs. G., Covent Garden and Waltham Cross. 'Kleenup A' for trial; 300 Narcissus bulbs for rock meadow; 'Winter Volck' for trial.

MONTPELIER BOTANIC GARDEN. Collection of seeds.

MOORE, Lady, Rathfarnham. Plant of *Primula deorum.*

MORLEY, C., Fordham. Apple 'Alfriston' × 'Lane's Prince Albert' for trial.

MORRIS, Messrs. R. A. Carrots, Brussels Sprouts, Beet, Salvias, Phlox, for trial.

MORSE, Messrs. C. C., San Francisco. Carrots for trial.

MORSE BROS., Messrs., Melton. *Rosa polyantha* for trial.

MORSE & SON, Messrs., Norwich. Primula for trial.

MORTEN, A. J., Hartpury. Rose 'Agnes Wilks' for trial.

MORTON ARBORETUM, The, Illinois. Collection of seeds.

MOSCOW BOTANIC GARDEN. Collection of seeds.

MUNICH BOTANIC GARDEN, Germany. Collection of seeds.

MUSGRAVE, C. T., Hascombe. Seedlings of *Lupinus lepidus*; seed of *Pentstemon glaucus* and *P. procerus.*

MUSGRAVE, C. T., Godalming. Plants of *Linum narbonense*; collection of seeds.

NAGELS, F., France. Dahlias for trial.

NANCY BOTANIC GARDEN, France. Collection of seeds.

NATURAL HISTORY MUSEUM, Paris. Collection of seeds.

NEW ZEALAND ALPINE SOCIETY. Cones of Kauri pine *Agathis australis*; seeds of Weeping Flax; collection of seeds.

NIX, C. G. A., Crawley. Collection of mosses for Herbarium; books for Library; ferns from Truro.

NUTTING, Messrs., London. Broccoli, Carrot, Brussels Sprouts, Broad Beans, Beet, Dwarf French Beans, for trial.

OLDHAM, W. R., Windlesham. Plants of Cydonia 'Incendie,' and 'Vermilion'; trees of *Prunus Cerasifera nigra*; Rose for trial; bush and tree of *Acer dissectum palmatifidium.*

OLIVER, T., Buralldown. Seed of *Sophora tetraptera.*

OLSEN, Messrs. CHR., Denmark. Brussels Sprouts, Carrots, Beet, for trial.

ORCHARD, C., Isle of Wight. Beans for trial.

ORPINGTON NURSERY CO., The, Orpington. Irises for trial.

OSLO BOTANIC GARDEN. Collection of seeds.

OUDEN, H. DEN, Holland. Hemerocallis for trial.

OWERMOIGNE NURSERIES LTD., Dorchester. Saxifrages for trial.

PALMER, F., London. Books for Library.

PALMER, R. M., British Columbia. Gladioli for trial.

PARISH, W. W., London. Bulbs from Patagonia; Hollyhock seed from S. America.

PEARSON & SONS, Messrs. J. R., Lowdham. Brussels Sprouts, Carrot, Salvias, for trial.

PENNELL & SONS, Messrs., Lincoln. Broad Beans, Beet, Carrot, for trial.

PERRY, A., Enfield. Seed of *Polystichum munitum, Lilium tenuifolium, Leucocrinum montanum, Pyxidanthera barbulata, Conaria Conradi*; collection of plants and seeds from Nyasaland; Solidago, Hemerocallis for trial; plants of Pyrethrum and Helianthus.

PILKINGTON, G. L., Liverpool. Iris for trial.

PILKINGTON, Mrs., Prescot. Plants of Aubrietia 'Lancashire Beauty.'

PITCAIRN-CAMPBELL, A. D., Wrexham. Phlox for trial.

POLACK, A. J. P., Africa. Bulbs of *Moraea polystachya.*

POOLE, F., London. Poppy for trial.

PRESTON, Miss, Canada. Collection of seeds.

PRICHARD, M., Christchurch. Hemerocallis for trial.

PRIOR, Messrs., Colchester. Roses for trial.

Prius, H., Wisbech. Gladioli, Narcissi for trial; Bulbs of *Tulipa kuschkensis* from Turkestan.

Pruhonica Botanic Garden. Collection of seeds.

Rawlence, A. D., Kingston. Seed of *Anchusa myosotidiflora grandiflora.*

Rayner, Dr., London. Cuttings of *Itea ilicifolia.*

Reid, P. D., Dublin. Lobelia for trial.

Rich & Cooling, Messrs., Bath. Phlox for trial.

Rivoire, Père & Fils, Messrs., Lyon. Beet, Broad Bean, Egg Plants, Salvias, Brussels Sprouts, Phlox, Carrots, Dwarf French Bean, for trial.

Roger, R. V., Pickering. Saxifrages for trial.

Rome Botanic Garden. Collection of seeds.

Rosenheim, P., East Molesey. Seed of *Campanula excisa, Senecio uniflorus.*

Rothschild, L. de. Seed of *Callicarpa rubella.*

Ruys, Messrs. B., Holland. Saxifrages, Pæonies, Hemerocallis, for trial.

Sadler, W., Streatham. Iris for trial.

Salbach, C., California. Irises for trial.

Salgues, Dr., France. Collection of seeds.

Salmon, E. E., Reigate. Plants of *Saxifraga umbrosa, Mentha gracilis.*

Salter, Dr., Tolleshunt D'Arcy. *Alstroemeria* plants.

Sapporo Botanic Garden. Collection of seeds.

Scarlett, J. W., Musselburgh. Brussels Sprouts for trial.

Secrett, F. A., Twickenham. Narcissus for trial.

Sewell, A. J., Weybridge. Plants of *Triptilion,* frilled *Gentiana, Primula Allionii alba.*

Sharpe, W. S., Durham. Canes of Raspberry 'Devon' for trial.

Siena Botanic Garden. Collection of seeds.

Simpson & Sons, Messrs. W. H., Birmingham. Broad Beans, Brussels Sprouts, Salvia, Phlox, Broccoli, Carrot, Beet, Canterbury Bells, Lupins, Antirrhinums, for trial.

Siphon Syringe Co., Messrs., London. One "Siphon" Syringe for trial.

Slade, Miss V., Lingfield. Collection of bulbs and seeds.

Sluis en Groot, Messrs., Holland. Broad Bean, Carrot, Salvia, Phlox, Lupins, for trial.

Smith, R., Leeds. Collection of seeds.

Speed, Messrs. H. J., Evesham. Beet, Broad Beans, Carrots, Broccoli, Brussels Sprouts, for trial.

Spinks, G. T., Bristol. Grafts of Apple 'Maggie Grieve' for Fruit-testing Scheme.

Spruijt, Messrs., Utrecht. Lupin, Carrot, Phlox, Brussels Sprouts, Broad Beans, Beet, for trial.

Stacey, G. W., Chorley Wood. Grafts of Apple 'Lane's Oakland Seedling' for trial.

Stern, F. C., Goring-by-Sea. Collection of seeds.

Sternol, Ltd., Messrs., London. Bottle of "Protexon" for trial.

Stevens & Son, Messrs., Sidmouth. Apple 'Woolbrook Russet'; canes of Raspberry 'Steven's Desirée' for trial.

Stockholm Botanic Garden. Collection of seeds.

Stokes, Lady, Ockham. Seed of Pea 'Blue Sudan.'

Stokes, W. H., Rhodesia. Corms of *Gladiolus coccineus.*

Streatfeild, Mrs. J., Eastbourne. Seed of *Strelitzia regina.*

Stredwick, J., St. Leonards-on-Sea. Dahlias for trial.

Stuckley, Sir Hugh, Bideford. Plant of *Populus trichocarpa.*

Studd, Lady, London. Seed of Lilac Maidenhair from Lachen.

Stuttgart Botanic Garden. Seed of *Gentiana altaica* and *Arnica sacchalinensis.*

Sutton & Sons, Messrs., Reading. Godetia and Eschscholtzia for trial; Crocus corms.

Taylor, Mrs. R., Ickenham. Auricula for trial.

Teschendorff, V., Dresden. Euphorbia for trial.

Therkildsen, K., Southport. Trees of Apples sent for trial.

Thornely, Mrs., Devizes. Poppy for trial.

Thorpe & Sons, Messrs. E. J., Brackley. Apple trees and grafts for trial.

Thwaite, N., London. Peas for trial.

Timothy & Sandwith, Messrs., Bracknell. "D.6" Dust, "Kolodust," "Kolotex," for trial.

Tod, Col. E., Herne. Seed of *Viola cucullata alba.*

Tokyo Botanic Garden. Collection of seeds.

Topswoort, Messrs., Holland. Dahlia for trial.

Tracey, Mrs., Wimbledon. Collection of seeds from Rep. de Colombia.

Treseder, W., Cardiff. Dahlias, Dwarf French Beans, for trial.

TRINITY COLLEGE BOTANIC GARDEN, Dublin. Collection of seeds.

TROTTER, R. D., Ockley. Collection of seeds; Crocus corms for rock garden; seed of *Anemone Pavonina*, Red Tigridia, *Euphorbia acanthophasmon*; cuttings of Pink.

TURNER, C., Slough. Dahlias for trial.

UNIVERSITY BOTANIC GARDEN, LATVIA. Collection of seeds.

UNKNOWN DONOR. Seed of *Notospartium carmichaelia.*

UNKNOWN DONOR, U.S.A. Delphinium seed.

UPPSALA BOTANIC GARDEN. Collection of seeds.

VAN DER SCHOOT, R. A., Hillegom. Dahlia for trial.

VAN TUBERGEN, Messrs., Haarlem. Lupins for trial.

VAN VEEN, W., Holland. Lupin and Hemerocallis for trial.

VASEY, A., London. Helenium for trial.

VEITCH, Messrs. R., Exeter. Raspberry, Lupins, Salvias, Phlox, Brussels Sprouts, Egg Plants, Carrot, Broad Beans, Broccoli, Beet, for trial.

VERREY, Mrs. L. C., Oxshott. Plants of *Primula pulverulenta.*

VIENNA BOTANIC GARDEN. Collection of seeds.

VILMORIN, ANDRIEUX, Messrs., France. Collection of seeds.

VOSS, Messrs. W., London. "Creol," "Tar Oil Wash," "Reinforced Catterscab," for trial.

WACHER, Dr. H. S., Canterbury. Collection of seeds.

WAGENINGEN BOTANIC GARDEN. Collection of seeds.

WALKER, Col., Budleigh Salterton. Seed of *Delphinium macrocentron.*

WALKER, Mrs. R., Stirling. *Erica carnea alba* from Italy.

WALLER-FRANKLIN SEED CO., The, California. Gaillardias and Larkspurs, for trial.

WARBURG, Sir OSCAR, Headley. Collection of seeds.

WARSAW BOTANIC GARDEN, Poland. Collection of seeds.

WATKINS & SIMPSON, Messrs., London. Beet, Brussels Sprouts, Broad Beans, Salvias, Phlox, Lupins, Canterbury Bells, Dwarf French Beans, for trial.

WATSON, J. H., Manchester. Irises for trial.

WEBB & SONS, Messrs., Stourbridge. Phlox, Lupins, Broad Beans, Beet, Brussels Sprouts, Broccoli, Carrots, Canterbury Bells, for trial.

WEBSTER, C., Gordon Castle Gardens. Grafts of Apple 'Batchelor's Glory' for trial.

WELLS, W., Merstham. Plants of Gypsophila 'Bristol Fairy.'

WEST, W., Winchester. Red Currant bushes for trial.

WHITE, J. G., Aberlour. Sweet-scented Begonias.

WILLCOX, W., New Zealand. Collection of seeds.

WILLIAMS, Dr. A. H., Horsham. Collection of seeds.

WILLIAMS, P. D., Cornwall. *Narcissus triandrus* hybrids.

WILSON, G. L., Ireland. Daffodils for trial.

WRAY, C., Grayshott. Plants of *Diospyros Kaki.*

YELD, G., Gerrard's Cross. Hemerocallis for trial.

ZAAIZAADVEREENIGING "NUNHEM," Limburg. Brussels Sprouts, Carrots, Beet, Broad Beans, for trial.

ZAGREB BOTANIC GARDENS. Collection of seeds.

ZURICH BOTANIC GARDEN. Collection of seeds.

ZWAAN & DE WILJES, Messrs., Holland. Beet, Carrots, for trial.

ZWAAN & VAN DER MOLEN, Messrs., Holland. Beet, Brussels Sprouts, Carrots, Broad Beans, Broccoli, Dwarf French Beans, for trial.

AWARDS TO SUNDRIES MADE DURING 1928.

These Awards are valid for Ten Years and lapse in 1938.

Tools and Appliances.

Award of Merit.

1. Rolcut Secateurs, from Mr. B. J. Walker, 14 Regent Street, W. 1.
2. Wheelbarrow with caterpillar tractor wheel and adjustable axle, from The Oxford Trackless Barrow Co., Oxford.
3. Planet Jr. Manure Distributor, from Messrs. Lloyds & Co., Letchworth.
4. Rubber strip for tying in buds and for tying grafts, from Messrs. Slaymaker, 25 Catherine Street, Covent Garden, W.C.
5. Centaur Tractor for cultivating land, from Messrs. Hansen of Astor House, Aldwych.

Highly Commended.

6. Plan-tie, a soft green string for tying plants, from Messrs. Larson & Sons, Rodney Street Works, Oldham Road, Manchester.
7. Wasp trap, from Messrs. Corry, Ltd , Shad Thames, London.

Commended.

8. Siphon Syringe, from the Siphon Syringe Co., 14 Gloucester House, Charing Cross Road, W.C.

Weed-Killer.

Highly Commended.

9. Non-poisonous weed-killer, from Messrs. Corry, Ltd., Shad Thames, London.

Insecticides, Fungicides, etc.

Award of Merit.

10. Volck, for use as a spray against white fly, scale and similar insect pests, both under glass and in the open, from Messrs. G. Monro, 4 Tavistock Street, Covent Garden, W.C.
11. Abolene, for use as a winter egg-killing wash, from Messrs. Abol, Beltring, Kent.
12. Carbo-Craven, for use as a winter egg-killing wash, from Messrs. Craven, Port Street, Evesham.
13. M.F. Powder, for use as a dust spray against insects, from Messrs. Craven.
14. Powder 3 A.B., for use as a dust spray against insects and as a deterrent against the ravages of birds, from Messrs. Craven.
15. Venetan, for use against all kinds of aphis, from Messrs. Bayer Products, Ltd., 19 St. Dunstan's Hill, London, E.C. 3.

INDEX.

The references in italics are to figures and illustrations.

Abstracts, alphabetically arranged, 248, 450
Acacia Farnesiana, its scent, 141
Acer creticum, 389, 392
  griseum, 145
Aconites, scentless, 140
Actinidia coriacea, xciii
Adiantum flabellatum, **A.M.,** lv
Aethionema Warley ruber, **A.M.,** liii
" Agricultural Entomology," by D. H. Robinson and S. G. Jary, reviewed, 440
Akebia quinata, its scent, 141
" Allotment Gardening," by W. Good, reviewed, 240
Almond, its scent, 142
Alstroemeria Ligtu angustifolium, **A.M.,** ci
Alyssum ideum, 407
Amaryllis blanda, xciii
" Amateur's Greenhouse, The," by T. W. Sanders, reviewed, 243
Amygdalus incana, 392
Anemone coronaria, 395
    incisa, 395
    parviflora, 395
  ' Everton Strain,' **A.M.,** l
  fulgens, xxxiii
  pavonina, **A.M.,** xlix, xxxiii
  stellata, 395, xxxiii
    Heldreichii, 395
Anemones in Crete, 395, 401
Annual meeting, 1928, i
Anthurium Andreanum ' Mrs. James Rothschild,' **A.M.,** c
    versaillense, **A.M.,** c
    waddesdonense, **A.M.,** c
    ' Yvonne Johnson,' **A.M.,** c
  Rothschildianum ' Comet,' **A.M.,** xlviii
Antirrhinum majus rust, xcii
    unbranched, xcii
Aponogeton abysinnicum, xxxv
Appel, Dr. O., " Krankheiten des Kern- und Steinobstes," 246
Apple ' High View Pippin,' **A.M.,** xxxvi
  ' King George V.,' **A.M.,** xcviii
  ' Saltcote Pippin,' **A.M.,** xxxvi
Apples, order of flowering, xciv
Aquilegia suaveolens, its scent, 140
Arbutus in Crete, 389
Arum creticum, 406
Askiphu ravine, 405
Asparagus tenuifolius, its scent, 141
Asphodeline cretica, *389*, 397
  lutea, 397
Aspidistra flowers, 139
Aster Amellus, 424
  A1, cxiv
  ' Eclipse,' **A.M.,** cxiv
  ' Empress of Colwall,' **A.M.,** cxiv
  Frikartii, 424
    ' Stäfa,' 424
  Kobold,' **A.M.,** cxiv
  Pink Perfection,' **A.M.,** cxiv
  Preciosa,' cxiv
  Red Star,' **A.M.,** cxiv
  Silver Spray,' **A.M.,** cxiv
  Sonia,' **A.M.,** cxiv
  Thomsonii, **A.G.M.,** 424
    nanus, 424
  Viola, **A.M.,** cxiv
Astilbe simplicifolia, **A.G.M.,** 424
Astragalus creticus, 389, 407
Atraphaxis Billardieri, 389, 394
Auricula ' Bookham Glory,' **A.M.,** xlviii
Autumn show, 1928, lxxxvii
Award of Garden Merit, 218, 423
Azalea indica ' Charme de Noël,' **A.M.,** xlvii
    ' Étoile de Belgique,' **A.M.,** xlvii
    ' Triumph,' **A.M.,** xlvii
    ' Magog,' **A.M.,** lv

Bailey, L. H., " The Garden Lover," 246
Baker, G. P., on plant hunting in Crete, 387
Bayes, G., on fountains and garden sculpture, 291
" Beautiful Flowers of Kashmir," by E. Blatter, reviewed, 434
Bees and extra floral nectaries, xcii
Begonia ' Eges Favourite,' **A.M.,** cxviii
  ' Florence Bigland,' **A.M.,** liv
Berberis cretica, 392, 406
  in Crete, 389
  leaf spines, xciii
Bergamot, its scent, 144

" Biology of Insects, The," by George H. Carpenter, reviewed, 241
" Black's Gardening Dictionary," by E. T. Ellis, reviewed, 240
Blatter, E., " Beautiful Flowers of Kashmir," 434
" Book of Garden Animals, The," by E. F. Daglish, reviewed, 447
" Book of Shrubs," by A. C. Hottes, reviewed, 447
Book Reviews, 237, 431
Books added to Library, 1928, lxxx, cxx
Borage, scentless, 140
Bose, Sir J. C., " The Motor Mechanism of Plants," 438
Botanical Certificate, xxxi
Bower, F. O., " Ferns," 245
  "The Origin of a Land Flora," 442
Brassica sinapis galled, xcii
Brassocattleya × ' Sindoro,' **A.M.**, lxv
Brenchley, Winifred E., " Inorganic Plant Poisons and Stimulants," 247
" British Garden Flora, A," by J. W. C. Kirk, reviewed, 244
Brooks, F. T., " Plant Diseases," 436
Brown, E. T., " The Easy Gardening Book," 246
  N. E., on the genus Dierama, 193
Brunsdonna × blanda, **A.M.**, cx
  × Parkeri alba, **F.C.C.**, xciii, cix
Bulbophyllum Binnendijkii, **F.C.C.**, lxviii
Bulbs, diseased, xxxiii
Bursaria spinosa, **A.M.**, cx
Buxton, B., *see* F. V. Darbishire on reaction of cell sap of flowers, 203, 211
Bye-laws, 122

Calceolaria crenatiflora, **A.M.**, li
  Darwinii, **A.M.**, lv
Calibanus caespitosus, xxxii
Callicarpa rubella, **A.M.**, xxxix
Calycanthus floridus, its scent, 141
Camellia rosaeflora flore pleno, **A.M.**, xlii
Campanula cretica saxatilis, 402
  mollis, 403
  Raineri, 402
  speciosa, **A.M.**, civ
Cardamine cretica, 393
" Care of Ornamental Trees in Planting, Fertilizing, Pruning, Tree Surgery and Spraying," by C. I. Greeves Carpenter, reviewed, 243
Carnation ' Citron,' **A.M.**, liv
  ' Evelyn Townley," **A.M.**, xlvi
  ' Ivory,' **A.M.**, xlviii
  ' Margot Holmes,' **A.M.**, lx
  ' Mrs. A. J. Cobb,' **F.C.C.**, lii
  ' Rapture,' **A.M.**, cxiii
  ' Sidney Crowhurst,' **A.M.**, cii
  ' Sunny,' **A.M.**, liv
  ' The Lady Seaforth,' **A.M.**, l
  ' Warden,' **A.M.**, cxviii
  ' Wivelsfield Buttercup,' **A.M.**, cxviii
Carob in Crete, 389
Carpenter, C. I. G., " Care of Trees," 243
  G. H., " The Biology of Insects," 241
Caryopteris mongolensis, **A.M.**, cvii
Cassiope selaginoides, **A.M.**, xlv
" Catalogue of Lewis's Medical and Scientific Circulating Library," reviewed, 446
Catasetum Clusiana, xxxiii
  Christyanum, xxxiii
    nigrum, **A.M.**, lxv
Cattleya × ' Dr. M. Lacroze,' lxix
  × ' Remy Chollet' var. ' Bruges,' **A.M.**, lxiv
  Trianae, lxiv
Celery seed, its scent, 138
Celsia arcturus, 394
Cereus × Coopermannii, xcii
" Charles Darwin: the Man and his Warfare," by H. Ward, reviewed, 435
Charter, new, 115
Chelsea Show, xxvi
Cherries, Japanese, 159
  order of flowering, xciii
Cherry Asagi, 176
  Asano, 168
  Benden, 165
  ' Benifugen,' 167
  Beni-Kan-Zakura, 178
  ' Beni-tora-no-o,' 169, 170
  Choji-Sakura, 179
  Choshu-Hisakura, 165
  Clove, 179
  Daikoku, 167
  dwarf trees, 179
  Fudan-Zakura, 175
  Fuji, 178
  Gijo, 166
  Gioiko, 176
  Hatazakura, 173, 174
  Higan-Zakura, 176, 177
  Hisakura, 165
  Hitomaro, 173
  Hokizakura, 175
  Hokusai, 166, 167
  Horinji, 171
  Ichiyo, 171
  Ito-Kukuri, 170
  Jindai-Zakura, 177
  Jo-Nioi, 173
  Kaba-Zakura, 176
  Kabuto-Zakura, 171
  Kanzan, 165
  Kiku-Shidare-Zakura, 169
  Kiku-Zakura, 171
  Kiriginu, 176
  Kojima, 172, 173
  Kokonoye-Sakura, 166
  Komatsunagi, 172, 173
  Miyama-Sakura, 180
  Momiji-gawa, 175
  Murasaki, 166
  Murasaki-Zakura, 166
  Ojochin, 168
  Okiku-Zakura, 171
  Oku-Miyako, 172

Cherry Oshokun, 170
  Ouchi-Yama, 173, 174
  Sakon, 173
  Sargent's, 163
  Sendai-Ito-Zakura, 177
  'Senriko,' 168
  Shidare-Yoshino, 174
  Shikizakura, 175
  Shin-Nishiki, 176
  Shirotae, 172, 173
  Shiro-Yamazakura, 164
  Shogetsu, 172
  Sumizome, 166
  Tai-Haku, 173
  Taimin, 173, 174
  Taizanfukun, 175
  Tao Yoma Zakura, 165
  Temari, 170
  Tora-no-o, 173
  Udzu-Zakura, 167
  Ukon, 176
  Umineko, 179
  Usu-Kan-Zakura, 178
  Yae-Murasaki-Zakura, 165, 166
  Yedo-Zakura, 168, 169, 170
  Yoshino, 174, 175, 177
  Zenkoji, 173
Chimonanthus fragrans grandiflorus, **A.M.**, xl
"China: Mother of Gardens," by E. H. Wilson, reviewed, 442
Chionodoxa cretica, 393, 397
  nana, **A.M.**, 397, xlv
  in Crete, 399, 407
Chittenden, F. J., on Award of Garden Merit, 218, 423
Chlorosis, xxxv
Choananthus Wollastonii, **A.M.**, lxi
Chrysanthemum 'Aurora,' **A.M.**, cxviii
  'Crimson Conquest,' **A.M.**, xxxix
  'Friendly Rival,' **A.M.**, cxviii
  'Garnet King,' **A.M.**, cxviii
  'Golden Security,' **A.M.**, cxii
  'Gwen Rodda,' **A.M.**, cxvii
  'Hilda Canning,' **A.M.**, cxvii
  'Hugh Mitchell,' **A.M.**, cxvii
  'Matchless,' **A.M.**, cxiii
  Mawii, **A.M.**, lv
  'Mayford Cream,' **A.M.**, cxiv
  'Mrs. John Norman,' **A.M.**, cxviii
  'Mrs. O'Neill,' **A.M.**, cxvii
  'Phineas,' **A.M.**, cxv
  'Shoreham Spray,' **A.M.**, cxv
  'Sonia,' **A.M.**, cxvii
  'Splendour,' **A.M.**, cxvii
  'Triumph,' **A.M.**, cxvii
Cichorium Intybus roseum, **A.M.**, ciii
  spinosum, 392
Cistus creticus, 391, 402
  ladaniferus, 402
  sp. in Crete, 389, 399, 401
  villosus, 402
Citrons in Crete, 404
Clark-Kennedy, A. E., "Stephen Hales," 443
Clematis Armandii, its scent, 138
Clover, its scent, 140
Colchicum 'Glory of Heemstede,' **A.M.**, cxi
  in Crete, 392, 395
  libanoticum, 396
  luteum, **A.M.**, xlii
  'Premier,' **A.M.**, cxi
  pusillum, 396, 407
  'Water Lily,' **A.M.**, cxi
Colour in garden planning, 282
Committee, Floral, xxxix, c
  Fruit and Vegetable, xxxvi, xcvi
  Narcissus, lxxi
  Orchid, lxii
  Scientific, xxxi, xcii
"Comparative Morphology of Fungi," by Drs. Gaumann and Dodge, 436
Compositae, scent of, 140
Conference report on garden planning, 256, 258
    primulas, 1
Conifer, swelling on root, xxxi
Convolvulus, its scent, 140
Corchorus japonicus, 423
Cordyline longifolia, xxxii
Coridothymus capitatus, 391
Corydalis rutaefolia, 407
Cotoneaster Harroviana, **A.M.**, cxvi
  its scent, 139
Cran, M., "The Joy of the Ground," 241
Crataegus Carrierei, **A.G.M.**, 218
  oxyacantha, its scent, 139
  mexicana, 218
  monogyna, 389
    its scent, 139
  stipulacea, 218
Crawford and Balcarres, Earl of, opens exhibition of garden design, 260
"Creation by Evolution," ed. by F. Mason, reviewed, 439
Cremanthodium Delavayi, xxxv, xcii
Crete, plant hunting in, 387
Crocus Boryi, 397
  Cartwrightianus, 397
  Fontenayi, 397
  graveolens, its scent, 141
  in Crete, 392, 399, 407
  its scent, 138
  karduchorum, **A.M.**, xciii, cxiii
  laevigatus, 397
  Olivieri, 396
  Sieberi heterochromos, 396
  vernus, 397
Crowfoot, G. M., "Flowering Plants of Sudan," 449
"Cultivation of Citrus Fruits, The," by H. H. Hume, reviewed, 240
Cupressus macrocarpa, xxxi
    swelling in root of, xxxi
  sempervirens horizontalis, *396*
Cyclamen creticum, 391, 395, 398
  enation on, xxxi
  latifolium, 395
  neapolitanum, 395
  persicum, xxxi
  pseudo-graecum, 391, 395
  weevil attack, xcv

- Cymbidium × 'Ceres,' Wyld Court var., **A.M.**, lxvi
  - × 'Eagle' 'Excelsior,' **A.M.**, lxvi
  - × 'Erica Sander,' Wyld Court var., **A.M.**, lxiv
  - insigne 'Mrs. Carl Holmes,' **A.M.**, lxv
  - × 'Joy Sandler' 'Orbis,' **A.M.**, lxviii
  - × 'Landrail' 'Ophir,' **A.M.**, lxv
  - × 'Letty' 'Exbury,' **A.M.**, lxv
  - × 'Lilian Sander' var. aureum, **A.M.**, lxiv
  - × 'Moira,' lxiii
  - × Pauwelsii 'Croesus,' **A.M.**, lxv
  - × 'Rosanna' 'Magnolia,' **F.C.C.**, lxvi
- Cypress in Crete, 389, 391, 392, 399, 400
- Cyprianthi cretica, xxxiv
- Cypripedium × 'Bedouin' aureum, **A.M.**, lxii
  - double, xcv
  - × 'Jungfrau,' **A.M.**, lxiii
- Cytisus creticus, 392
  - 'Lady Moore,' **A.M.**, lv

- Daffodil Show, 1928, xxv
- Daglish, E. F., "The Book of Garden Animals," 447
- Dahlia 'Apoldro,' **A.M.**, 226
  - Edeghem,' **A.M.**, 229
  - Ethelwulf,' **A.M.**, 229
  - Little Marvel,' **A.M.**, 228
  - Lowfield Maroon,' **A.M.**, 228
  - Mermaid,' **A.M.**, 226
  - Mevrouw E. Ludwig,' **A.M.**, 227
  - Mrs. A. S. Galt,' **A.M.**, 226
  - Pink Perfection,' **A.M.**, 226
  - Redpole,' **A.M.**, 229
  - Red Riding Hood,' 226
  - R. H. Holton,' **A.M.**, 227
  - Ruth,' **A.M.**, 226
  - Seafield,' **A.M.**, 226
  - Stedfast,' **A.M.**, 229
  - The Bishop of Llandaff,' **A.M.**, 226
  - Thomas Moore,' 226
  - Topaz,' **A.M.**, 226
- "Dahlias," by F. F. Rockwell, reviewed, 439
- Dahlias, fasciated, xciii
  - tried at Wisley, 226
- Daphne buxifolia, 399
  - collina, 399
  - oleoides, 399
  - sericea, 391, 399
  - sp. in Crete, 389
- Darbishire, F. V., *see* Buxton, B.
- Darnell, A. W., "Hardy and Half-Hardy Plants," 443
- Dasylirion caespitosum, xxxii
  - Hartwegianum, xxxii
  - Hookeri, xxxii
- Daucus Carota, its flowers, xciii
  - gummifer, xciii
- Davis, G. K., "Horticultural Enterprises," 440
- Dawtrey Drewitt, F., "The Romance of the Apothecaries' Garden at Chelsea," 245
- Delphinium hybrids, xciii
  - macrocentron, xciii
  - 'Monarch of Wales,' **A.M.**, cii
- Dendrobium acuminatum, lxix
  - thyrsiflorum Galliceanum, **F.C.C.**, lxix
- Design of gardens, exhibition, 256, 260
- Dialeurodes Chittendeni, 214
- Dianthus arboreus, 392, 401
- Dicentra chrysantha, **A.M.**, lv
- Dierama argyreum, 194, 196, 199, 202
    - major, 194
  - atrum, 195, 198
  - Cooperi, 196, 199
  - cupuliflorum, 195, 197, 200
  - Davyi, 195, 198
  - dubium, 194, 196, 199, 202
  - elatum, 195, 199
  - ensifolium, 197, 198
  - Galpinii, 196, 200
  - gracile, 197, 200
  - igneum, 195, 201
  - insigne, 194, 198
  - latifolium, 194, 199
  - major, 202
  - medium, 194, 197, 199, 201
    - Mossii, 196, 202
  - palustre, 196, 199
  - pansum, 197, 201
  - pauciflorum, 195, 200, 201
  - pendulum, 193, 194, 197, 199, 200
    - 'Windhover,' **A.M.**, civ
  - pictum, 196, 198
  - pulcherrimum, 193, 194, 197
  - pumilum, 195, 199
  - ragum, 200
  - robustum, 196, 197, 201
  - rupestre, 195, 198, 199
  - trichorhizum, 194, 202
  - Tysonii, 196, 197, 200
  - vagum, 195
- Dillistone, G., on the small English garden, 306
- Dipladenia Sanderi, **A.M.**, cxviii
- Dodge, Dr., *see* Gaumann
- Donors of plants, etc., to Wisley, cxxv
- Dracocephalum speciosum, **A.M.**, lv
- Duchêne, M. A., on formal parks and gardens in France, 272
- Dunnington-Grubb, H. B., on garden design in Canada, 350

- Easton, J. M., Short description of the New Hall, 113
- "Easy Gardening Book, The," by E. T. Brown, reviewed, 246
- Ebenus creticus, 393
- Edwards, A., "Rock Gardens," 444
- "Einjahrsblumen," by P. Kache and C. Schneider, reviewed, 437

Elder, its scent, 139
" Elements of Botany," by Richard W. Holman and Wilfred W. Robbins, reviewed, 244
Ellis, E. T., " Black's Gardening Dictionary," 240
Embothrium coccineum, **A.M.**, lviii
Encarsia formosa, 189
  partenopea, 189
Enkianthus quinqueflorus, xxxiii
Ephedra fragilis, 392
Eremurus Bungei ' Highdown Gold,' **A.M.**, lx
Erica vagans ' Lyonesse,' **A.M.**, civ
  verticillata, 398, 409
Eriophyes tiliae, xxxv
Escallonia ' Donard Brilliance,' **A.M.**, lx
  illinita, its scent, 138
Eucalyptus ficifolia, cv
Euphorbia acanthothamnos, *388*, 389
" Evergreens for the Small Place," by F. J. Rockwell, reviewed, 241
" Evolution and Classification of Soils, The," by E. Ramann and C. L. Whittles, reviewed, 244
Excoecaria bicolor, **A.M.**, xlii

Fatsia japonica, xxxii
    fruiting of, xxxii
Fenwick, M., on garden design, 299
" Ferns," by F. O. Bower, reviewed, 245
" Fertilizers and Manures," by Sir A. D. Hall, reviewed, 439
Festuca ovina forms, xciv
  rigida, xcv
  rottboelioides, xcv
" Field Book of Common Gilled Mushrooms," by William S. Thomas, reviewed, 245
Figs in Crete, 405
Filipendula lobata, 425
  rubra, 425
" Five Hundred Hints by 500 Gardeners," reviewed, 243
" Flowering Plants of Northern and Central Sudan," by G. M. Crowfoot, reviewed, 449
Flowers, The *p*H value of cell sap of, 203, 211
Foremarke Cup Competition, lxxxvi
" Forestry Question in Great Britain," by E. P. Stebbing, reviewed, 434
Fountains, 291, *292*, *293*
Foxglove, scentless, 140
Fox Wilson, G., The Rhododendron White-fly, 214
France, formal parks and gardens, 272
Freesia ' Albâtre,' **A.M.**, xliv
  ' Delight,' **A.M.**, xliv
  its scent, 140
Fritillaria latifolia, **A.M.**, xlvii
Fritsch, F. E., and E. J. Salisbury, " An Introduction to the Study of Plants," 435
Frost, S. W., *see* Needham, J. G.
Fruit cold storage, xciv
  competitions, 1928, lxxxv, lxxxvi
" Fruit, Flower and Vegetable Trades Year Book and Diary," reviewed, 437
Fruit Show, 1928, lxxxix
    Imperial, xci

Gagea foliosa, 407
Garden design, colour in, 282
    exhibition, *256*, *257*, *264*, *265*, *268*
      opened, 260
    in Canada, 350
      France, 272
    recent developments, 280
" Garden Lover, The," by L. H. Bailey, reviewed, 246
Garden ornament, 321
  planning conference, 256, 258
" Gardening Under Glass," by F. F. Rockwell, reviewed, 446
Gardens in Plantagenet times, 262
Gaumann, Dr., and Dr. Dodge, " Comparative Morphology of Fungi," 436
Gazania pavonia, **A.M.**, lv
Gentiana stragulata, **A.M.**, cvii
Geum ' Fire Opal,' **A.M.**, liv
Gibbs, Hon. V., on Robinias at Aldenham and Kew, 145
Gilia androsacea, its scent, 138
Gladiolus ' Dragon Lyonnais,' **A.M.**, cvi
  segetum, 397
Gleichen, Lord Edward, takes chair, 291, 298
Gloriosa richmondensis, **A.M.**, civ
Godetia " Double Shell-pink," cvii
Good, W., " Allotment Gardening," 240
Gothein, Marie Louise, " A History of Garden Art," 237, 431
Grapes in Crete, 404
Gum ladanum, brush for collecting, *389*
  tragacanth, *389*
Gymnocladus canadensis, xciv

Haas, P., and T. G. Hill, " Introduction to Chemistry of Plant Products," 247, 444
Hall, new, described, 113
Hall, Sir A. D., " Fertilizers and Manures," 439
Hamamelis mollis, its scent, 144
Hampton, Dr. F. A., " The Scent of Flowers," 138
" Hardy and Half-Hardy Plants," by A. W. Darnell, reviewed, 443
" Hardy Heaths and some of their Nearer Allies," by A. T. Johnson, reviewed, 239, 431
Harrogate, deputation to, lxxxvi
Hart, J. N., " Rose Growing," 445
Hawks, E., " Pioneers of Plant Study,' 433

- Hawthorn, gall on, xxxii
  - its scent, 139
- Heath, its scent, 140
- Helenium Bolanderi, **A.M.**, ci
- Hemerocallis 'Radiant,' **A.M.**, cii
- Herbaceous borders, 379
- "Herbaceous Border Flowers," by H. H. Thomas, reviewed, 246
- Hill, T. G., *see* Haas, P.
- Hippeastrum 'Baroness Schröder,' **A.M.**, l
  - 'Cerise magnificum,' **A.M.**, xliv
  - puniceum ignescens, **A.M.**, xlix
  - reticulatum 'Mrs. Garfield,' **A.M.**, cviii
- "History of Garden Art, A," by Marie Louise Gothein, 431
  - reviewed, 237
- Holman, Richard W., "Elements of Botany," 244
- Honeysuckle, its scent, 140
- Hood, G. W., "Horticulture: Elementary and Practical," 446
- Hoot, Sir A. F., "The Unconventional Garden," 433
- "Horticultural Enterprises," by G. K. Davis, reviewed, 440
- "Horticulture: Elementary and Practical," by G. W. Hood, reviewed, 446
- Hottes, A. C., "The Book of Shrubs," 447
- "How to Enjoy Garden Flowers," by Marcus Woodward, reviewed, 241
- Hume, H. H., "The Cultivation of Citrus Fruits," 240
- Hussey, C., on ornament in the garden, 321
- Hydrangea 'D. Ingamells,' **A.M.**, liv
  - 'H. J. Jones,' **A.M.**, liv
  - 'Mrs. A. Simmonds,' **A.M.**, lii
  - 'Mrs. R. F. Felton,' **A.M.**, liv
  - quercifolia, **A.M.**, cviii
- Hypericum reptans, **A.G.M.**, 425

- Illumination, its effect on plants, 354
- Ingram, Collingwood, on Japanese cherries, 159
- "Inorganic Plant Poisons and Stimulants," by Winifred E. Brenchley, reviewed, 247
- "Introduction to the Chemistry of Plant Products," by P. Haas and T. G. Hill, reviewed, 247, 444
- "Introduction to the Study of Plants," by F. E. Fritsch and E. J. Salisbury, reviewed, 435
- Iris cretica, 394
  - Cypriana, 394
  - germanica in Crete, 394, *404*
  - graminea, its scent, 141
  - × Japo-Watt, **A.M.**, xlvii
  - reticulata, its scent, 141
  - sibirica 'Caesar,' **A.M.**, lvii
    - 'Ottawa,' **A.M.**, lvii
  - sisyrinchium, 394
  - stylosa, its scent, 138
- Iris tuberosa, 394
  - unguicularis, 394, 395
- Ixia pendula, 197, 198
  - trichorhiza, 202

- Japanese cherries, note son, by Collingwood Ingram, 159
- Jary, S. G., *see* Robinson, D. H.
- Jasmine, its scent, 140
- Jekyll, Miss G., on colour in garden planning, 282
- Jenkins, G. H., on recent developments in garden design, 284
- Johnson, A. T., "Hardy Heaths and some of their Nearer Allies," 239, 431
- Johnstone, Mary A., "Plant Ecology," 245
- "Joy of the Ground, The," by M. Cran, reviewed, 241
- Juniperus Oxycedrus, 389
  - phoenicea, 389, 392

- Kache, P., and C. Schneider, "Einjahrsblumen," 437
- Kalanchoe Kirkii, xxxiii
  - sp., xxxiii
- Kerria japonica, **A.G.M.**, 423
- Kirk, Lt.-Col. J. W. C., "A British Garden Flora," 244
- "Krankheiten des Kern- und Steinobstes," by Dr. O. Appel, reviewed, 246

- "Laboratory Manual of Elementary Botany," by E. W. Sinnott, reviewed, 247
- Lachenalia Arabia, **A.M.**, 224
  - Boundii, **A.M.**, 225
  - Calcutta, **A.M.**, 225
  - Canada, **A.M.**, 224
  - Leiden, **A.M.**, 224
  - Mandalay, **A.M.**, 224
  - pendula, 223
  - Siam, **A.M.**, 224
  - Tibet, **A.M.**, 224
  - Tipperary, **A.M.**, 225
- Lachenalias tried at Wisley, 223
- Ladanum, 402
- Laeliocattleya × 'Anaconda,' lxix
  - × Canhamiana alba superba, lxx
  - × 'Clarilaw,' **A.M.**, lxviii
  - × 'Gwendolen Leach,' **A.M.**, lxv
  - × Hassallii alba, lxviii
  - × 'Invicta,' **F.C.C.**, lxviii
  - × 'Miss Faith H. Hanbury,' **A.M.**, lxx
  - × 'Mrs. Chamberlain Chandler,' **A.M.**, lxviii
- Lambourne, the late Lord, *253*, 260
- Laurentia tenella, 390
- Lavandula Staechas, 401
- Lavender, its scent, 142

- "Lawns," by F. F. Rockwell, reviewed, 442
- "Leaf-Mining Insects," by J. G. Needham, S. W. Frost and B. H. Tothill, reviewed, 242
- Leptospermum scoparium roseum multipetalum, **A.M.**, xlii
- Le Sueur, H. A. D. C., on roadside planting, 412
- Leucocoryne ixioides, xciii
- Lilac attacked by scale insects, xxxi
  - its scent, 138
- "Lilac: a Monograph," by S. D. McKelvey, reviewed, 431
- Lilies, their scent, 140
- Lilium candidum, 401
  - pyrenaicum, its scent, 141
- Lime, galls on, xxxv
- Lime tree, its scent, 140
- Linnaea borealis, lvi
- Linum arboreum, 400
- Lithospermum incrassatum, 407
- Livingstone, A. E., "Management of Greenhouses and Frames," 247
- Lobelia 'The Bishop,' **A.M.**, cvi
- Lolium, British sp., xciv
- Lonicera pyrenaica, **A.M.**, lv
  - syringantha, its scent, 144
- Lowson, J. M., "Textbook of Botany," 437
- Lupins, Annual, at Wisley, 230
- Lupinus affinis, 230
  - albus, 230
  - Hartwegi, 230, 231
    - albus, **A.M.**, 231
    - White, **A.M.**, 231
  - hirsutissimus, 230
  - hirsutus, 230
  - Hybridus roseus, **A.M.**, 231
  - luteus, 230
    - Romulus, **A.M.**, 231
  - micranthus, 230
  - mutabilis, 230, 231
  - nanus, 230
  - pilosus, 230
  - pusillus, 230
  - subcarnosus, 230
  - sulphureus, 230
  - tricolor rosa, **A.M.**, 231
- Lycaste × Balliae, lxiv
- Lychnis alba, xxxi
  - dioica, xxxi
  - × intermedia, xxxi
- Lycium halimifolium, xciv
- Lythrum sp. in Crete, 390

- McKelvey, S. D., "The Lilac: a Monograph," 431
- Macself, A. J., *see* Sanders, T. W., 246
- Mahoberberis × Neubertii, xciii
- Malus coronarius, its scent, 141
- "Management of Greenhouses and Frames, The," by A. E. Livingstone, reviewed, 247
- Manihot utilissima variegata, **A.M.**, cxii
- Maple wood curiously marked, xcii
- Maples in Crete, 389, 392
- Marlborough, the Duke of, takes chair, 272, 280
- Marshall, O., "Practical Gardening for Children," 246
- Martin, H., "The Scientific Principles of Plant Protection," 441
- Mason, A. F., "Spraying, Dusting and Fumigating, 242
  - F., "Creation by Evolution," 439
- Matthiola incana, xxxiv
  - native species, xxxiv
  - sinuata, xxxiv
- Maximov, A., "Plants and Water," 447
- Meconopsis, A new, xxxi
  - superba, xxxii
  - Wallichii, xxxii
- Meeting, Annual, 1928, i
- Meetings, General, i, xxv, lxxxv
- Mentha arvensis hirtipes, xxxiv
  - citrata, its scent, 144
  - Pulegium, xxxiv
  - rotundifolia × viridis, xxxiv
  - sp. xxxii
  - varieties, xxxiv
  - verticillata, xxxii
- Miltonia × gattonensis, **A.M.**, lxix
  - × gattonensis 'Stonehurst,' **A.M.**, lxx
  - × 'Lucia' Paterson's var., **F.C.C.**, lxvii
  - × 'Lycaena' gigantea, **A.M.**, lxx
  - × 'Mona,' **F.C.C.**, lxviii
  - × 'Princess Mary,' lxviii
  - × Sanderiana 'June,' **A.M.**, lxx
- Mimulus moschatus, its scent, 143
- Monardella macrantha, **A.M.**, ciii
- Montbretia 'Hon. Mrs. Edward Montagu,' **A.M.**, cix
  - 'Mrs. Whittaker,' **A.M.**, cix
  - 'Panama Pacific,' **A.M.**, cix
  - 'Sir Matthew Wilson,' **A.M.**, cix
- Morphixia trichorhiza, 202
- "Motor Mechanism of Plants," by Sir J. C. Bose, reviewed, 438
- Mountain Ash, its scent, 139
- Muller, W. J., on herbaceous borders, 379
- Musk, its scent, 140
- Muticia oligodon, **A.M.**, civ
- Myosotis idae, 407
- Myrtle in Crete, 396

- Narcissus 'Beauty of Cambridge,' **A.M.**, lxxiii
  - 'Bradwardine,' **A.M.**, lxxii
  - 'Clwyd,' **A.M.**, lxxii
  - 'Comrade,' **A.M.**, lxxiii
  - 'Copper Bowl,' **A.M.**, lxxiv
  - 'Golden Goblet,' **A.M.**, lxxiii
  - 'Goviley,' **A.M.**, lxxii
  - 'Hades,' **A.M.**, lxxiii
  - 'Holmdale,' **A.M.**, lxxiii
  - 'Icilinda,' **A.M.**, lxxii
  - 'J. K. Ramsbottom,' **A.M.**, lxxii
  - 'Mystic,' **A.M.**, lxxiv

Narcissus 'Narrabri,' **A.M.**, lxxiii
  'Nissa,' **A.M.**, lxxiv
  'Quartz,' **A.M.**, lxxiv
  'Red Rim,' **A.M.**, lxxiv
  'Red Sea,' **A.M.**, lxxiii
  'Silver Plane,' **A.M.**, lxxiii
  'Trewirgie,' **A.M.**, lxxii
  'Wide Wing,' **A.M.**, lxxii
  'Zionist,' **A.M.**, lxxi
Nardostachys Jatamansi, its scent, 144
Needham, J. G., "Leaf-Mining Insects," 242
Nepenthes Russellii, **A.M.**, cvi
Nerium Oleander, xxxiv
Nitrate poisoning, xciii
Nolina, xxxii
Notes and abstracts alphabetically arranged, 248, 450
Nymphaea pygmaea rubra, **A.M.**, liv

Oaks in Crete, 389, 390, 391
Odontioda × 'Brockhurst,' Stonehurst var. **A.M.**, lxvii
  × 'Gloriosa' 'Mrs. R. F. Felton,' **F.C.C.**, lxviii
  × 'Grenadier' 'The Node,' **A.M.**, lxvi
  × majestica 'Brilliant,' **A.M.**, lxviii
  × 'Maureen' 'Mavourneen,' **A.M.**, lxix
  × 'Monica,' lxix
  × 'Murillo' 'The Duchess,' **F.C.C.**, lxviii
  × 'Picardie,' **A.M.**, lxix
  × 'Rubicon,' **A.M.**, lxvii
  × 'Van Eyck,' **A.M.**, lxvii
Odontoglossum × ardentissimum xanthotes var. perfecta, **A.M.**, lxiv
  × 'Belenus,' lxv
  × 'Camilla' 'Empress,' **A.M.**, lxviii
  crispum 'Carl Holmes,' **F.C.C.**, lxvii
    'Harvest Moon,' **F.C.C.**, lxviii
    'Pearl McBean,' **A.M.**, lxviii
    'Premier Disraeli,' lxx
    'The Tetrarch,' **A.M.**, lxviii
  Golden Glory,' **A.M.**, lxix
  Mona,' 'Regina,' **F.C.C.**, lxviii
  Norba,' **P.R.**, lxvi
  Terentia,' lxii
  × 'Thetis,' **A.M.**, lxiv
  × 'Toreador' 'Ursula,' **A.M.**, lxii
  Wyattianum, xxxi
Odontonia × 'Aglaon,' **A.M.**, lxii
  × 'Amoena,' **A.M.**, lxiii
  × 'Windsor,' **P.R.**, lxvii
Oenothera eximia, its scent, 140
Oleander in Crete, 390
Olive in Crete, 389, 404, *405*, *408*
Omphalogramma elegans, **A.M.**, cxii
Oncidium macranthum, lxx
Ononis diacantha, 389
Onosma erectum, 408
Ophrys apifera, 403
  aranifera, 403
  bombylifera, 403
  fusca, 403
  lutea, 403
Orange, its scent, 142
Oranges in Crete, 405
Orchis fragrans, 403
  lactea, 403
  longibracteata, 403
  pallens, 403
  papilionacea, 403
Origanum Dictamnus, 397
"Origin of a Land Flora, The," by F. O. Bower, reviewed, 442
Ornament in the garden, 321
Osmanthus Delavayi, its scent, 144
Otiorrhynchus attacking cyclamen, xcv
Ourisia coccinea, **A.M.**, liii
Owens, C. E., "Principles of Plant Pathology," reviewed, 436
Oxalis gigantea ? xxxiv, xxxv

Paeonia arietina cretica, 399
  corallina, 399
  cretica, 392
  peregrina, 399
Pæonies, Chinese, their scents, 144
  in Crete, 398, 399
"Peonies, the Manual of the American Peony Society," reviewed, 437
Pancratium maritimum, 397
Papaver hybridum, xxxiii
  Orientale 'Fortune,' **A.M.**, lix
  see Poppy
Park, a modern, 299
Pea, Chilean, xcv
  purple-podded, xciv
Pear in Crete, 392
  mistletoe on, xxxiv
  with foliaceous sepals, xciii
Pears, order of flowering, xciv
Pentstemon glaber, **A.M.**, lx
Peppermint, its scent, 142
"Perfect Garden, The: How to keep it beautiful and fruitful," by W. P. Wright, reviewed, 240
Pernettya 'Bell's Seedling,' **A.M.**, xlvii
Perowskia atriplicifolia, **A.M.**, cx
Phacelia campanularia, **A.M.**, 221
Phillyrea sp in Crete, 389, 400
Phlomis in Crete, 389, 391, 398
  lanata, 392
Phlox 'Amami,' **A.M.**, cvi
  Drummondii tried at Wisley, 1928, 427
  'Evangeline,' **A.M.**, cvii
  'Rachel,' **A.M.**, cvii
  'Sweetheart,' **A.M.**, cvii
Pines in Crete, 389, 391
"Pioneers of Plant Study," by E. Hawks, reviewed, 433

Pistachia Lentiscus, 389
  Terebinthus,
" Plant Diseases," by F. T. Brooks, reviewed, 436
" Plant Ecology," by Mary A. Johnstone, reviewed, 245
Plant hunting in Crete, 387
" Plant Life and its Romance," by F. E. Weiss, reviewed, 449
" Plants and Water," by A. Maximov, reviewed, 447
Plants, British, xxxiii
Platanus orientalis evergreen, 398
  in Crete, 404
Platytheca galioides, **A.M.**, lx
Plums, order of flowering, xciii
Pollination in orchards, xxxi
Polygonum affine, its scent, 138
  Aubertii, **A.M.**, 218
  baldschuanicum, **A.M.**, 218
  multiflorum, 219
Poppy 'Barton Mills Strain,' **A.M.**, lvii
  Iceland, 'Moonbeam,' **A.M.**, cii
  'Pride,' **A.M.**, lvii
" Popular Hardy Perennials," by T. W. Sanders and A. J. Macself, reviewed, 246
Poterium spinosum, *388*, 389
" Practical Botany for Matriculation," by G. M. Shuttleworth, reviewed, 244
" Practical Gardening for Children," by O. Marshall, reviewed, 246
Primrose aberrations, xxxiii
  its scent, 138
Primula cernua, **A.M.**, li
  heucherifolia, **A.M.**, lv
  Juliae, xxxiii
  malacoides 'Rosalind,' **A.M.**, xliii
  Menziesiana, **A.M.**, li
  × Rewensis, xxxiii
  × Rewensis dialysed, xxxiii
  rosea 'Brockhurst,' **A.M.**, xlviii
  sinensis double 'Sutton's Purity,' **A.M.**, xl
  stellata 'Hillside Blue,' **A.M.**, xli
  × Tess, xxxiii
Primulas, a new parasite of, xxxi
" Principles of Applied Zoology," by R. A. Wardle, reviewed, 440
Principles of Plant Pathology," by C. E. Owens, reviewed, 436
Privet, its scent, 139
" Problems of Applied Entomology," by R. A. Wardle, reviewed, 441
Protea compacta, **A.M.**, cxii
Pruhonice, the park of, 299
Prunus apetala, 179
  Avium, 162
  campanulata, 178
  Davidiana alba, **A.M.**, 220
    albiflora, 221
  hupehensis, 162
  incisa, 178
    f. serrata, 179
  Lannesiana, 174
Prunus Lannesiana f. benitoranowo, 170
    f. sirotae, 172
  Maximowiczii, 180
  media, 164
  mutabilis, 161, 163, 164, 174
    f. dilucularis, 163
  prostrata, 389, 408
  sachalinensis, 162, 163
  sacra, 164
  serrulata, 161, 162
    affinis, 173
    ambigua, 175
    chrysanthemoides, 171
    conspicua, 169, 170
    daikoku, 167
    decora, 171
    formosissima, 169, 170
    f. albida, 172
    f. rosea, 168
    fundanzakura, 175
    fungenzo, 167
    Geraldinae, 168
    hatazakura, 173
    homogena, 166
    kabazakura, 176
    longipes, 172
    nobilis, 168, 169
    ojochin, 168
    okiku, 171
    plena pendula, 168
    pubescens, 164
      f. taizanfunkun, 175
    purpurea, 166
    sachalinensis, 163
    semperflorens, 175
    sirotae, 172
    spiralis, 167
    splendens, 165
    spontanea, 161
    subfusca, 166
    taoyoma, 165
    temari, 170
    unifolia, 171
  speciosa, 162, 174, 179
  subhirtella, 176, 179
    ascendens, 174, 176
  sylvestris, xxxi, xxxiii
    mistletoe on, xxxiii
  tenuiflora, 161
  'Unimeko,' **A.M.**, xlix
  yedoensis, 164, 174, 175
    pendula, 174
Putoria calabrica, 392
Pyrus Aria incisa, xxxv
    varieties, xciv
  Lemoinei, **A.M.**, liii
  Malus theifera, **A.M.**, liii
  parviflora, 389, 392
  'Russell's Weeper,' **A.M.**, xlix

Quercus calliprinos, 390
  coccifera, 389, 390
  Ilex, 389, 390, 391, 406
  macrolepis, 390

- Quercus pubescens, 390
- Quinces in Crete, 404

- Ramann, Dr. E., the late, "The Evolution and Classification of Soils," 244
- Ranunculus asiaticus, **A.M.**, 395, lviii
  - brevifolius, 395
  - bullatus, 395
  - calandrinioides, xciv
  - cortusaefolius, **A.M.**, liii
  - cupreus, 395
  - flabellatus, xxxiv
  - in Crete, 401
  - Sprunerianus, 395
- Rhamnus in Crete, 389
- Rhododendron 'Anne,' **A.M.**, li
  - arboreum nigrescens, **A.M.**, xliv
  - keleticum, **A.M.**, li
  - 'Kernick Gem,' **A.M.**, xliv
  - 'Linley Sambourne,' **A.M.**, lii
  - 'Mars,' **A.M.**, lii
  - 'Princess Juliana,' **A.M.**, lii
  - 'Rosemary Chipp,' **A.M.**, liii
  - 'Sheila Osborn,' **A.M.**, lx
- Rhodora canadensis, **A.M.**, xli
- Ribes sanguineum splendens, **A.G.M.**, 426
- Ricotia cretica, 393
- Roadside planting, 412
- Robbins, W. W., *see* Holman, R. W.
- Robertson, H., *see* Easton, J. M.
- Robinia Ashei, 146, 147
  - × bella-rosea, 146, 147
  - Boyntonii, 146, 148
  - coloradensis, 146, 148
  - × dubia, 146, 147
  - Elliottii, 146, 147
  - grandiflora, 146, 147
  - Hartwigii, 146
  - hispida, 146, 147, 148, 149
    - macrophylla, 147
    - nana, 147
  - × Holdtii, 146, 147, 148
    - britzensis, 146, 148
  - Kelseyi, 146, 148, 149
  - luxurians, 147, 148, 153, 157
  - nana, 147
  - neo-mexicana, 147, 148
  - Pringlei, 149
  - Pseudacacia, 146, 147, 148, 149, 157, 158
    - amorphaefolia, 152, 155
    - angustifolia, 152, 155
    - aurea, 152
    - Bessoniana, 152
    - bullata, 153
    - coluteoides, 153
    - crispa, 153
    - Decaisneana, 152, 153
    - Fabreana, 154
    - fastigiata, 154
    - glaucescens, 154
    - Gondouinii, 154
    - inermis, 154, 155
      - fastigiata, 155
      - latifolia, 155
      - pendula, 155
- Robinia Pseudacacia linearis, 155
    - lutea, 152, 155
    - mimosaefolia, 153, 154, 155, 156
    - monophylla, 153, 155
      - fastigiata, 156
      - pendula, 156
    - myrtifolia, 155
    - pendula nova, 156
    - pyramidalis, 154
    - Rehderi, 156
    - robusta Vignei, 156
    - Rosynskiana, 157
    - semperflorens, 157
    - tortuosa, 157
    - tragacanthoides, 155
    - umbraculifera, 157
    - viscosa, 157
  - × Slavinii, 149
  - viscosa, 147
- Robinias at Aldenham and Kew, by the Hon. Vicary Gibbs, 145
- Robinson, D. H., and S. G. Jary, "Agricultural Entomology," 440
- Robinson, W., "The Wild Garden," 446
- "Rock Gardens: How to Plan and Plant Them," by A. Edwards, reviewed, 444
- Rockwell, F. F., "Dahlias," 439
  - "Evergreens for the Small Place," 241
  - "Gardening Under Glass," 446
  - "Lawns," 442
- Roemeria hybrida, xxxiii
- "Romance of the Apothecaries' Garden at Chelsea, The," by F. Dawtrey Drewitt, reviewed, 245
- Rosa arvensis, its scent, 143
  - Coriifolia incana, xxxiii
  - Davidii, **A.M.**, cxiii
  - foetida, its scent, 141
  - highdownensis, **A.M.**, cx
  - lucida, its scent, 143
  - lutea, its scent, 141
  - mollis, xxxiii
    - coerulea, xxxiii
    - glandulosa, xxxiii
  - polyantha virescent and proliferous, xciii
  - pruinosa, xxxiii
  - rugosa, its scent, 143
  - sertata, its scent, 141
  - Soulieana, its scent, 143
  - sp., xxxiii
  - tomentosa, xxxiii
  - Wichuraiana, its scent, 143
  - Willmottiae, its scent, 141
- Rose 'à parfum de l'Hay,' its scent, 138
  - 'Chaplin's Pink Climber,' **A.M.**, c
  - 'Cherry,' **A.M.**, ci
  - 'Cramoisie Supérieur,' its scent, 142
  - 'George Dakon,' **A.M.**, cii
  - 'Gloria Mundi,' **A.M.**, liv
  - its scent, 141, 142, 143
  - 'Lady Forteviot,' **A.M.**, liv

Rose 'Lucie Marie,' **A.M.**, ci
Moss, reverted, xcii
Musk, its scent, 143
'Portadown,' **A.M.**, ci
'Swansdown,' **A.M.**, ci
"Rose Growing," by J. N. Hart, reviewed, 445
Rubus japonicus, 423
rusticanus inermis × thyrsiger, xcvii

Salisbury, E. J., *see* Fritsch, F. E.
Salix alba, xxxi
vitellina, xxxi
lanata, xxxii
Stuartii, xxxii
pentandra, xxxiv
vitellina pendula, xxxi
Salvia cretica, 391
'Early Dwarf Bedder,' **A.M.**, 235
'Fireball,' **A.M.**, 235
'Harbinger,' **A.M.**, 235
horminoides, xcii
patens, **A.M.**, 234, 236
pratensis, xcii
splendens, 234
verbenacea, xcii
Salvias for bedding tried at Wisley, 234
Sambucus glauca, **A.M.**, cxii
Sanders, T. W., "Popular Hardy Perennials," 246
"The Amateur's Greenhouse," 243
Sarcopodium Lyonii, lxix
Saxifraga Burseriana 'Brookside,' **A.M.**, xlii
'Delia,' **A.M.**, xliv
hederacea, 393
'Mrs. G. Prichard,' **A.M.**, xlvii
Scent of Flowers, 138
Schneider, C., on a modern park, 299
see Kache, P.
"Scientific Principles of Plant Protection," by H. Martin, reviewed, 441
Scilla amoena, 222
v. sibirica, 222
cernua, 222
sibirica atrocoerulea, **A.M.**, 222
Scolopendrium vulgare crispum subfimbriatum cristatum, **A.M.**, cxi
Sculpture in the garden, 291
Sedum creticum, 392
spectabile, **A.G.M.**, 219
atropurpureum, 220
'Brilliant,' 220
Shuttleworth, G.M., "Practical Botany for Matriculation," 244
Sideritis syriaca, 391, 392
Sinnott, E. W., "Laboratory Manual of Elementary Botany," 247
Small gardens, their design, 306
Smith, G. M., "A Textbook of General Botany," 437
Solanum Fontainesianum, xciii
pinnatum, **A.M.**, cviii
Sophrocattleya × 'Clarinda' var. gloriosa, **A.M.**, lxiv
Sorbus graeca, 389
Sparaxis pendula, 197, 201
pulcherrima, 197
Speyer, Edward R., on the Greenhouse White-fly, 181
Sphaeralcea acerifolia, **A.M.**, cviii
Spiraea lobata, 425
palmata, 425
venusta, **A.G.M.**, 425
albicans, 425
magnifica, 425
"Spraying, Dusting and Fumigating," by A. F. Mason, reviewed, 242
Stachys cretica, 393
Staechas, its perfume, 391
Staehelina arborescens, 394, 400
fruticosa, 394
Stanmore, Lord, takes the chair, 321
Stapelia, its scent, 139
Stebbing, E. P., "The Forestry Question in Great Britain," 434
"Stephen Hales," by A. E. Clark-Kennedy, reviewed, 443
Sternbergia graeca, 396
lutea, 396
Stranvaesia Davidiana, **A.M.**, cxvi
Strawberry leaves dying, their scent, 141
Strobilanthes isophyllus, **A.M.**, xli
Styrax officinale, 390, 400, *404*
Sultanas from Crete, 404
Sundries, awards in 1928, cxxxii
Sweet Basil, its scent, 142
Sweet Pea, its scent, 140
"Sweet Peas: their History, Development, and Culture," by C. W. J. Unwin, reviewed, 437
Sweet William spirally twisted, xcii
'Sweet Wivelsfield,' **A.M.**, cvii
Syringa 'Massena,' **A.M.**, lv
yunnanensis, **A.M.**, lviii
Wilsonii, **A.M.**, lvi

Tamarix sp. in Crete, 389
Taylor, H. V., on an investigation of walnuts, 410
Testudinaria elephantipes, xxxii
"Textbook of Botany," by J. M. Lowson, reviewed, 437
"Textbook of General Botany, A," by G. M. Smith, etc., reviewed, 437
Thomas, H. H., "Herbaceous Border Flowers," 246
W. S., "Field Book of Common Gilled Mushrooms," 245
Thunbergia chrysops, **A.M.**, cxvi
Thymelaea, 391
Tincker, M. A. H., on effect of length of day on plants, 354
Tipping, A., on the garden of pleasure in England, 262
Tobacco Plant, its scent, 140
Tothill, Beatrice, *see* Needham, J. G.
Trialeurodes vaporariorum, 181
Trifolium agrarium, xxxiii
procumbens, xxxiii
sp., xxxi

Triptilion spinosum, **A.M.**, ci
Tulip 'Dipper,' **A.M.**, lxxv
Tulipa chrysantha, xxxiii
  cretica, 396
  kuschkensis, xcv
  praecox, 396
  saxatilis, 396, 400, 401, *404*
  stellata, xxxiii
Tulips in Crete, 392, 399, 407
  with coloured leaves on scape, xxxiii

Ulmaria rubra, 425
Umbelliferae, its scent, 139
"Unconventional Garden, The," by Sir A. F. Hort, 433
Unwin, C. W. J., "Sweet Peas," 437
Ursinia anethoides, **A.M.**, lxi

Vallota hybrid, xcii
Vanilla, its scent, 140
Vegetable Show, 1928, lxxxix
Venidium fastuosum, **A.M.**, lviii
Verbascum spinosum, 392, 394
Viburnum Carlesii, its scent, 144
  fragrans, its scent, 144
Vines in Crete, 389
Viola 'Jersey Gem,' **A.G.M.**, 426
  lutea amoena, xxxiii
    multicaulis, xxxiii
    Pesneaui, xxxiii
  nana, xxxiii
Violas, British, xxxiii
Vitex Agnus-castus, 390
Vitis flexuosa, 156
  Piasezkii, 156

Walnut in Worcestershire, *412*
Walnuts, an investigation, 410
Warburg, Sir O., takes the chair, 306
Ward, H., "Charles Darwin: the Man and his Warfare," 435
Wardle, R. A., "The Principles of Applied Zoology," 440
  "The Problems of Applied Entomology," 441
Watsonia palustris, 197
Weaver, Sir L., takes the chair, 282, 284, 289
Weiss, F. E., "Plant Life and its Romance," 449
White-fly, Greenhouse, 181
  hosts, 183
  parasite, xciii
  Rhododendron, 214
Whittles, C. L., *see* Ramann, Dr. E., the late, 244
"Wild Garden, The," by W. Robinson, reviewed, 446
Willows, British, xxxi
Wilson, E. H., "China: Mother of Gardens," 442
Wisley contributions from the Laboratory, 203, 211, 214, 354
  donors of plants, seeds, etc., cxxv
Woodward, Marcus, "How to Enjoy Garden Flowers," 241
Wright, W. P., "A History of Garden Art," 237, 431
  "The Perfect Garden: How to keep it beautiful and fruitful," 240

Zauschneria californica latifolia, **A.M.**, cvi
  microphylla, **A.M.**, cviii
Zelkova Abelicea, 394
  cretica, 389, 392, 393, *396*, *400*
Zygine parvula, xxxi

Printed in England at The Ballantyne Press
Spottiswoode, Ballantyne & Co. Ltd.
Colchester, London & Eton